AIR QUALITY CONFORMITY ASSESSMENT
RAMONA BRANCH LIBRARY DEVELOPMENT SITE
SAN DIEGO COUNTY, CA

Submitted to:

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INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The subject property consists of approximately 7.32 acres within the downtown district of Ramona, California (refer to Figure 1 on the following page). Specifically, the project site is fronted by State Route 67 (SR 67) on the northwest corner of 13th and Main Street (SR 67). Access to the site is obtained via Main Street (SR 67) as can be seen in Figure 2 on Page 3 of this report.

The development site currently exists as a vacant previously disturbed lot as can be seen in Figure 3 on Page 4 of this report. The mean topography of the site is approximately 1,420 feet above mean sea level (MSL).

Project Description

The County of San Diego Department of General Services proposes to develop a new branch library in downtown Ramona on the northwest corner of 13th and Main Street. The library building will front Main Street and have a total footprint of approximately 21,000 square-feet (19,500 square feet of net usable space) as can be seen in Figure 4 on Page 5 of this report. To the rear of the proposed library structure will be a parking lot with 65 parking spaces, including three designated for handicapped parking. Vehicular access to the site is anticipated via a driveway off of 13th Street. The Ramona Library project will also include associated facilities such as landscaping and, potentially, internal walkways, as well as a sidewalk and pedestrian entrance to the site along Main Street.

Although the current project site is 7.32 acres in size, only a portion of the site is dedicated to the library, and the remainder will be rough graded for future development of public uses that will compliment the library facility. Future facilities may include a senior center, or other healthcare or recreational facilities.

Air Quality Definitions

Air quality is defined by ambient air concentrations of specific pollutants determined by the Environmental Protection Agency (EPA) to be of concern with respect to the health and welfare of the public. The subject pollutants, which are monitored by the EPA, are Carbon Monoxide (CO), Sulfur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Ozone (O_3), respirable 10- and 2.5-micron particulate matter (PM_{10}), Volatile Organic Compounds (VOC), Reactive Organic Gasses (ROG), Hydrogen Sulfide (H_2S), sulfates, lead, and visibility reducing particles. Examples of sources and effects of these pollutants are identified starting below and continued on Page 6 of this report.

- Carbon Monoxide (CO): Carbon monoxide is a colorless, odorless, tasteless and toxic gas resulting from the incomplete combustion of fossil fuels. CO interferes with the blood's ability to carry oxygen to the body's tissues and results in numerous adverse health effects. CO is a criteria air pollutant.

- Oxides of Sulfur (SO_x): Typically strong smelling, colorless gases that are formed by the combustion of fossil fuels. SO_2 and other sulfur oxides contribute to the problem of acid deposition. SO_2 is a criteria pollutant.

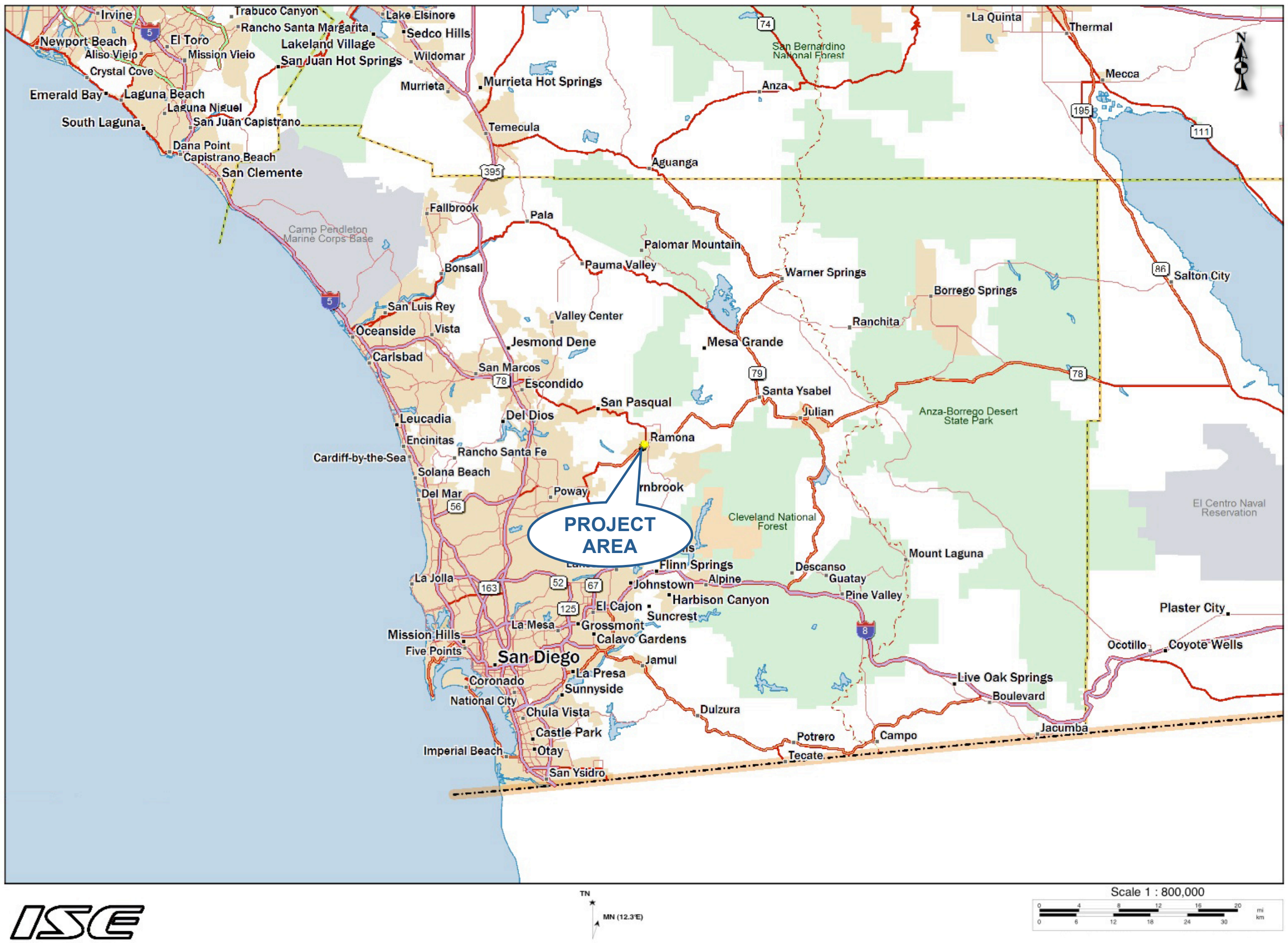

FIGURE 1: Project Vicinity Map (ISE 6/09)

FIGURE 2: Project Site Location Map and Property Boundary Extents (ISE 6/09)

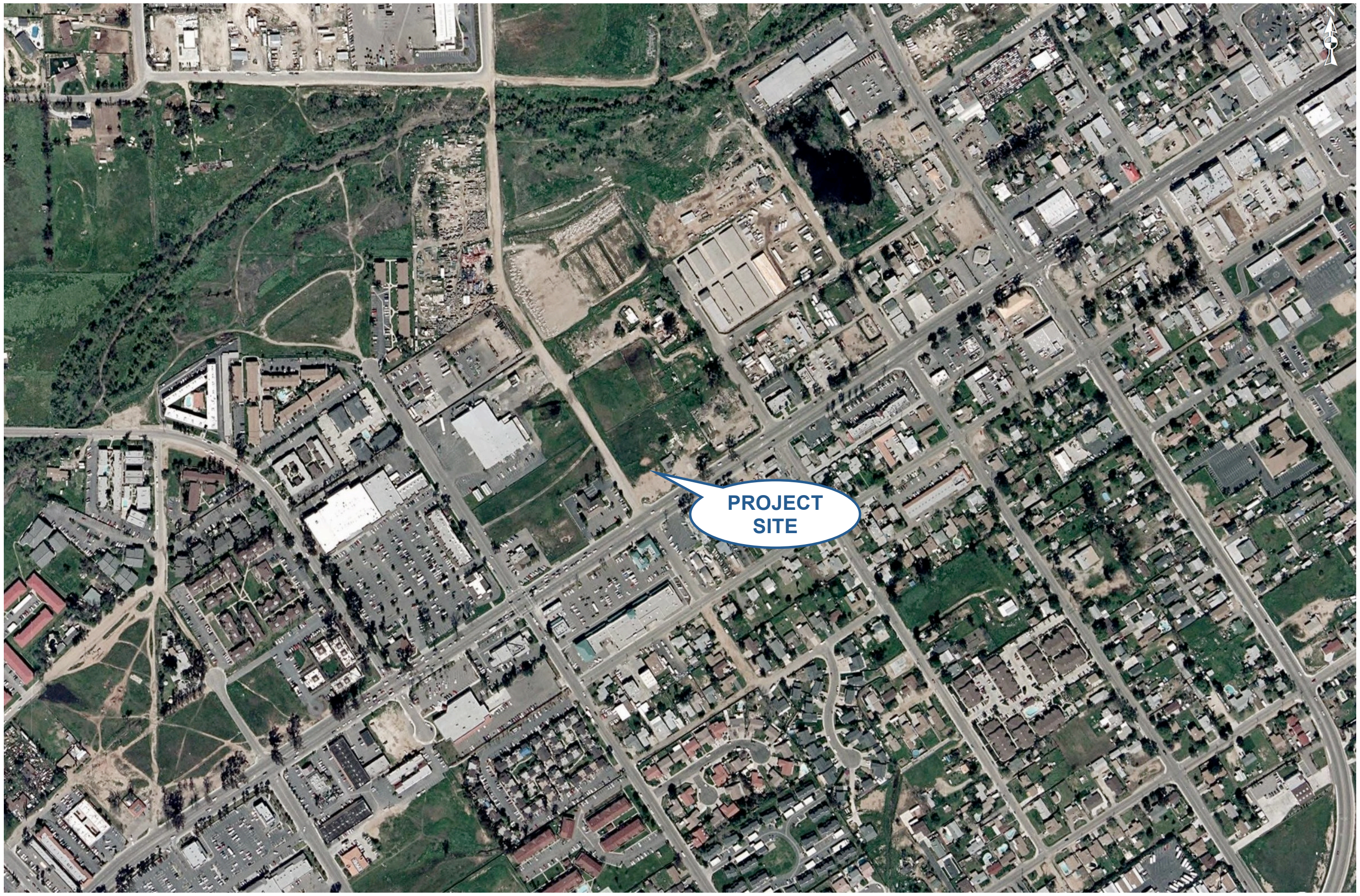

FIGURE 3: Project Site Aerial Photograph (Google Earth 6/09)

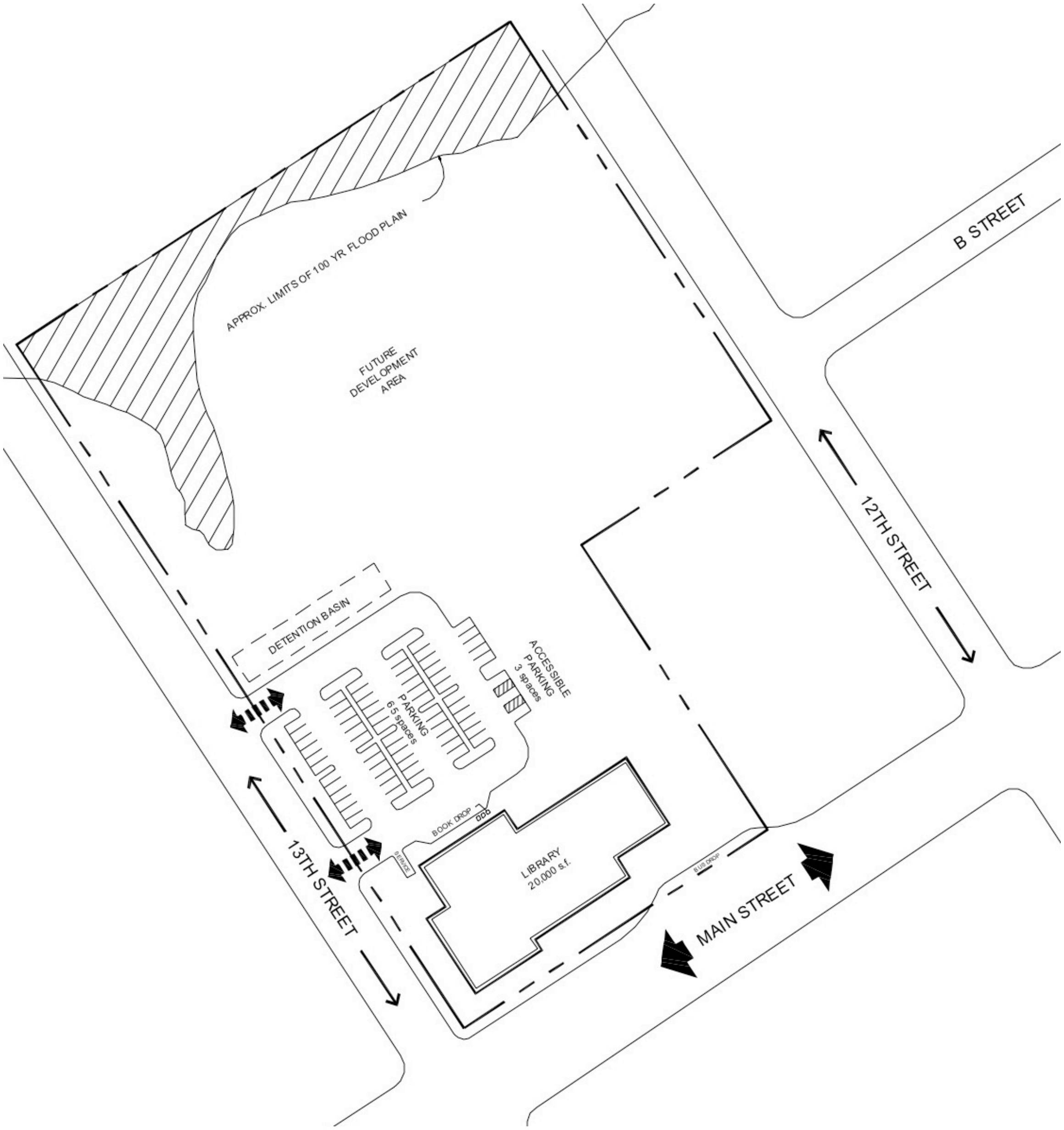

FIGURE 4: Proposed Ramona Branch Library Development Plan (HDR 5/09)

Further examples of source pollutants and effects of these pollutants are continued below:

- Nitrogen Oxides (Oxides of Nitrogen, or NO_x): Nitrogen oxides (NO_x) consist of nitric oxide (NO), nitrogen dioxide (NO_2), and nitrous oxide (N_2O); these are formed when nitrogen (N_2) combines with oxygen (O_2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, and 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO_2 is a criteria air pollutant, and may result in numerous adverse health effects. It absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility.

- Ozone (O_3): A strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the sun's energy. Ozone exists in the upper atmosphere ozone layer as well as at the earth's surface. Ozone at the earth's surface causes numerous adverse health effects and is a criteria air pollutant. It is a major component of smog.

- PM_{10} (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs, where they may be deposited, resulting in adverse health effects. PM_{10} also causes visibility reduction and is a criteria air pollutant.

- $PM_{2.5}$ (Particulate Matter less than 2.5 microns): A similar air pollutant consisting of tiny solid or liquid particles which are 2.5 microns or smaller (often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO_2 release from power plants and industrial facilities, and nitrates that are formed from NO_x release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions.

- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOC's contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent, when exposed to photochemical processes. VOC's often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate.

- Reactive Organic Gasses (ROG): Similar to VOC, Reactive Organic Gasses (ROG) are also precursors in forming ozone, and consist of compounds containing methane, ethane, propane, butane, and longer chain hydrocarbons which are typically the result of some type of combustion/decomposition process. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight.

- Hydrogen Sulfide (H_2S): A colorless, flammable, poisonous compound having a characteristic rotten-egg odor. It often results when bacteria break down organic matter in the absence of oxygen. High concentrations of 500-800 ppm can be fatal and lower levels cause eye irritation and other respiratory effects.

- Sulfates: An inorganic ion that is generally naturally occurring and is one of several classifications of minerals containing positive sulfur ions bonded to negative oxygen ions.

- Lead: A malleable metallic element of bluish-white appearance that readily oxidizes to a grayish color. Lead is a toxic substance that can cause damage to the nervous system or blood cells. The use of lead in gasoline, paints, and plumbing compounds has been strictly regulated or eliminated, such that today it poses a very small risk.

- Visibility Reducing Particles (VRP): VRP's are just what the name implies, namely, small particles that occlude visibility and/or increase glare or haziness. Since sulfate emissions (notably SO_2) have been found to be a significant contributor to visibility-reducing particles, Congress mandated reductions in annual emissions of SO_2 from fossil fuels starting in 1995.

The EPA established ambient air quality standards for these pollutants. These standards are called the National Ambient Air Quality Standards (NAAQS).[1] The California Air Resources Board (CARB) subsequently established the more stringent California Ambient Air Quality Standards (CAAQS). Both sets of standards are shown in Figure 5 at the bottom of the following page.[2] Areas in California where ambient air concentrations of pollutants are higher than the state standard are considered to be in *"non-attainment"* status for that pollutant.

THRESHOLDS OF SIGNIFICANCE

California Environmental Quality Act (CEQA) Thresholds

Section 15382 of the California Environmental Quality Act (CEQA) guidelines defines a significant impact as,

> *"… a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance."*

The minimum change in ambient air quality conditions within the County of San Diego, as identified by the San Diego Air Pollution Control District (SDAPCD), is outlined below.

CEQA Air Quality Screening Standards

The County of San Diego uses Appendix G.III of the State CEQA guidelines as thresholds of significance, and recognizes the SDAPCD's established screening thresholds for air quality emissions (*Rules 20.1 et. seq.*) as screening standards. These standards focus on the following potential impact areas, namely, would the project:

a) Conflict with or obstruct implementation of the applicable air quality plan?

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality

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[1] Under the Federal Clean Air Act of 1970, amended in 1977.

[2] The new CARB eight-hour ozone standard became effective in early 2006. The new federal $PM_{2.5}$ standard became effective in early 2007.

standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

d) Expose sensitive receptors to substantial pollutant concentrations?

e) Create objectionable odors affecting a substantial number of people?

These screening standards will be applied throughout this air quality conformity assessment for the basis of determination of both regional, as well as localized, air quality impacts due to the proposed project.

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	–	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 $\mu g/m^3$)		0.075 ppm (147 $\mu g/m^3$)		
Respirable Particulate Matter (PM10)	24 Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		–		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	15.0 $\mu g/m^3$		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		–	–	–
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 μg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 $\mu g/m^3$)		–		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	Ultraviolet Fluorescence	0.030 ppm (80 $\mu g/m^3$)	–	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (365 $\mu g/m^3$)	–	
	3 Hour	–		–	0.5 ppm (1300 $\mu g/m^3$)	
	1 Hour	0.25 ppm (655 $\mu g/m^3$)		–	–	–
Lead[8]	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	–	–	–
	Calendar Quarter	–		1.5 $\mu g/m^3$	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average[9]	–		0.15 $\mu g/m^3$		
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

FIGURE 5: Ambient Air Quality Standards Matrix (after CARB/EPA, updated 11/17/08)

SDAPCD Criteria Pollutant Standards

Pursuant to the California Health & Safety Code, jurisdiction for regulation of air emissions from non-mobile sources within San Diego County has been delegated to the San Diego County Air Pollution Control District (APCD).[3] As part of its air quality permitting process, the APCD has established thresholds for the preparation of Air Quality Impact Assessments (AQIA's) and/or Air Quality Conformity Assessments (AQCA's).

APCD Rule 20.2, which outlines these screening level criteria, states that any project that results in an emission increase equal to or greater than any of these levels, must:

> "… demonstrate through an AQIA . . . that the project will not (A) cause a violation of a State or national ambient air quality standard anywhere that does not already exceed such a standard, nor (B) cause additional violations of a national ambient air quality standard anywhere the standard is already being exceeded, nor (C) cause additional violations of a State ambient air quality standard anywhere the standard is already being exceeded, nor (D) prevent or interfere with the attainment or maintenance of any State or national ambient air quality standard."

The applicable standards are shown below, in Table 1. For Projects whose stationary-source emissions are below these criteria, no AQIA is typically required, and project level emissions are presumed to be less than significant.

TABLE 1: Thresholds of Significance for Air Quality Impacts

Pollutant	Thresholds of Significance (Pounds per Day)	Clean Air Act *less than significant* Levels (Tons per Year)
Carbon Monoxide (CO)	**550**	100
Oxides of Nitrogen (NO_x)	**250**	50
Oxides of Sulfur (SO_x)	**250**	100
Particulate Matter (PM_{10})	**100**	100
Particulate Matter ($PM_{2.5}$)	**55**	100
Volatile / Reactive Organic Compounds & Gasses (VOC/ROG)	**75**	50

Source: SDAPCD Rule 1501, 20.2(d)(2), 1995; EPA 40 CFR 93, 1993.

- Threshold for VOC's based on the threshold of significance for reactive organic gases (ROG's) from Chapter 6 of the CEQA Air Quality Handbook of the South Coast Air Quality Management District.
- Threshold for ROG's in the eastern portion of the County based on the threshold of significance for reactive organic gases (ROG's) from Chapter 6 of the CEQA Air Quality Handbook of the Southeast Desert Air Basin.
- Thresholds are applicable for either construction or operational phases of a project action.
- The PM2.5 threshold is based upon the proposed standard identified in the, *"Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds"*, published by SCAQMD in October 2006.

[3] Source: *California Health & Safety Code, Division 26, Part 3, Chapter 1, Section §40002.*

The County of San Diego accepts the use of these “screening criteria” as *“Thresholds of Significance”* by projects for the purposes of CEQA analysis. These standards are compatible with those utilized elsewhere in the State (such as South Coast Air Quality Management District standards, etc.) as part of CEQA guidance documents.

In the event that project emissions may approach or exceed these screening level criteria, modeling would be required to demonstrate that the project’s ground-level concentrations, including appropriate background levels, are below the Federal and State Ambient Air Quality Standards.

The existing ambient conditions are compared for the with- and without-project cases. If emissions exceed the allowable thresholds, additional analysis is conducted to determine whether the emissions would exceed an ambient air quality standard (i.e., the CAAQS values previously shown in Figure 5). Determination of significance considers both localized impacts (such as CO hotspots) and cumulative impacts. In the event that any criteria pollutant exceeds the threshold levels, the proposed action’s impact on air quality are considered significant and mitigation measures would be required.

For CEQA purposes, these screening criteria are used as numeric methods to demonstrate that a project’s total emissions (e.g. stationary and fugitive emissions, as well as emissions from mobile sources) would not result in a significant impact to air quality. Since APCD does not have AQIA thresholds for emissions of volatile organic compounds (VOC’s), the use of the screening level for reactive organic compounds (ROC) from the CEQA Air Quality Handbook for the South Coast Air Basin (SCAB), which has stricter standards for emissions of ROC’s/VOC’s than San Diego’s, is appropriate. No differentiation is made between construction and operation emission thresholds.

Finally, under the General Conformity Rule, the EPA has developed a set of *de minimis* thresholds for all proposed federal actions in a non-attainment area for evaluating the significance of air quality impacts. It should be noted that the State (i.e., SDAPCD) standards are equal to, or more stringent than, the Federal Clean Air standards[4]. Development of the proposed project would therefore fall under the stricter SDAPCD guidelines.

Combustion Toxics Risk Factors

When fuel burns in an engine, the resulting exhaust is made up of soot and gases representing hundreds of different chemical substances. The predominant constituents are:

- Nitrous Oxide
- Formaldehyde
- Sulfur Dioxide
- Nitrogen Dioxide
- Benzene
- Hydrogen Sulfide

[4] A fact that can be verified through multiplication of the SDAPCD standards by 365 days and dividing by 2,000 pounds.

- Carbon Dioxide
- Carbon Monoxide

Over ninety-percent (90%) of the exhaust emissions from an engine consist of soot particles whose size is equal to, or less than, 10-microns in diameter. Particles of this size can easily be inhaled and deposited in the lungs. Diesel exhaust contains roughly 20 to 100 times more emissive particles than gasoline exhaust. Of principal concern are particles of cancer causing substances known as *polynuclear aromatic hydrocarbons* (PAH's)[5].

There are inherent uncertainties in risk assessment with regard to the identification of compounds as causing cancer or other health effects in humans, the cancer potencies and Reference Exposure Levels (REL's)[6] of compounds, and the exposure that individuals receive. It is common practice to use conservative (health protective) assumptions with respect to uncertain parameters. The uncertainties and conservative assumptions must be considered when evaluating the results of risk assessments.

Since the potential health effects of contaminants are commonly identified based on animal studies, there is uncertainty in the application of these findings to humans. In addition, for many compounds it is uncertain whether the health effects observed at higher exposure levels in the laboratory or in occupational settings will occur at lower environmental exposure levels. In order to ensure that potential health impacts are not underestimated, it is commonly assumed that effects seen in animals, or at high exposure levels, could potentially occur in humans following low-level environmental exposure.

Estimates of potencies and REL's are derived from experimental animal studies, or from epidemiological studies of exposed workers or other populations.[7] Uncertainty arises from the application of potency or REL values derived from this data to the general human population. There is debate as to the appropriate levels of risk assigned to diesel particulates, since the USEPA has not yet declared diesel particulates as a toxic air contaminant.

Using the CARB threshold, a risk concentration level of one in one million (1:1,000,000) of continuous 70-year exposure is considered less than significant. A risk exposure level of ten in one million (10:1,000,000) is acceptable if Toxic Best Available Control Technologies (T-BACT's) are used. It should be noted that this type of reporting is only strictly applicable to large populations (such as entire air basins), where the sample group is sizeable and the exposure time is long (which is not the case for project-level construction projects).

[5] PAH's are a group of approximately 10,000 compounds which result predominately from the incomplete burning of carbon-containing materials like oil, wood, garbage or coal.

[6] The exposure level at which there are no biologically significant increases in the frequency or severity of adverse effect between the exposed population and the control group. Some effects may be produced at this level, but they are not considered adverse or precursors to adverse effects.

[7] Source: *CalEPA, USEPA, SCAQMD, 2001 et. seq.*

For purposes of analysis under this report, and to be consistent with the approaches used for other toxic pollutants, a functional comparison of the aforementioned risk probability per individual person exposed to construction contaminants will be examined. This approach has the advantage of not needing to quantify the population of the statistical group adjacent to the construction (which could yield false values) as well as allowing the per-person risk to be expressed as a final percentage (with a percentage level of 100% being equal to the impact threshold). Of course, for a large enough population sample (i.e., a million people or more) the results are the same as CARB's predictions.

ANALYSIS METHODOLOGY

The analysis criteria for air quality impacts are based upon the approach recommended by the *South Coast Air Quality Management District's (SCAQMD) CEQA Handbook*.[8] The handbook establishes aggregate emission calculations for determining the potential significance of a proposed action. In the event that the emissions exceed the established thresholds, air dispersion modeling may be conducted to assess whether the proposed action results in an exceedance of an air quality standard. The County of San Diego has adopted this methodology.

Ambient Air Quality Data Collection

The California Air Resources Board (CARB) monitors ambient air quality at approximately 250 air-monitoring stations across the state (representatively shown in Figure 6 on the following page by the symbol Ⓢ). Air quality monitoring stations usually measure pollutant concentrations 10 feet above ground level; therefore, air quality is often referred to in terms of ground-level concentrations. Ambient air pollutant concentrations are measured at 10 air-quality-monitoring stations operated by the SDAPCD.

The nearest ambient air-quality-monitoring station is located within the City of Escondido[9] approximately 13.2 miles from the project site and would be representative of ambient air conditions within the project site's region of the air basin. Given this, the Escondido station currently records CO, NO_2, O_3, PM_{10}, $BAM_{PM2.5}$, $PM_{2.5}$, Outdoor Temperature, Wind Direction, and Horizontal Wind Speed.[10]

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[8] The SCAQMD CEQA Handbook is a reference volume containing an extensive list of semi-empirical (quantified experimental) curve-fit equations describing various emissive sources having important context under CEQA. The equations are not perfect (in that they would not constitute an *'exact solution'* in a scientific sense), but are nonetheless a reasonable approximation of the physical problem. In the same light, programs which utilize the SCAQMD semi-empirical methodology (such as *URBEMIS 2007* and the like) provide no greater problem understanding than using the equations directly. Such programs are still subject to all of the same limitations as the methods and equations on which they rely.

[9] East Valley Parkway Station (600 E Valley Parkway, Escondido CA 92019) – ARB Station ID 80115.

[10] BAM = Beta Attenuation Mass monitoring,

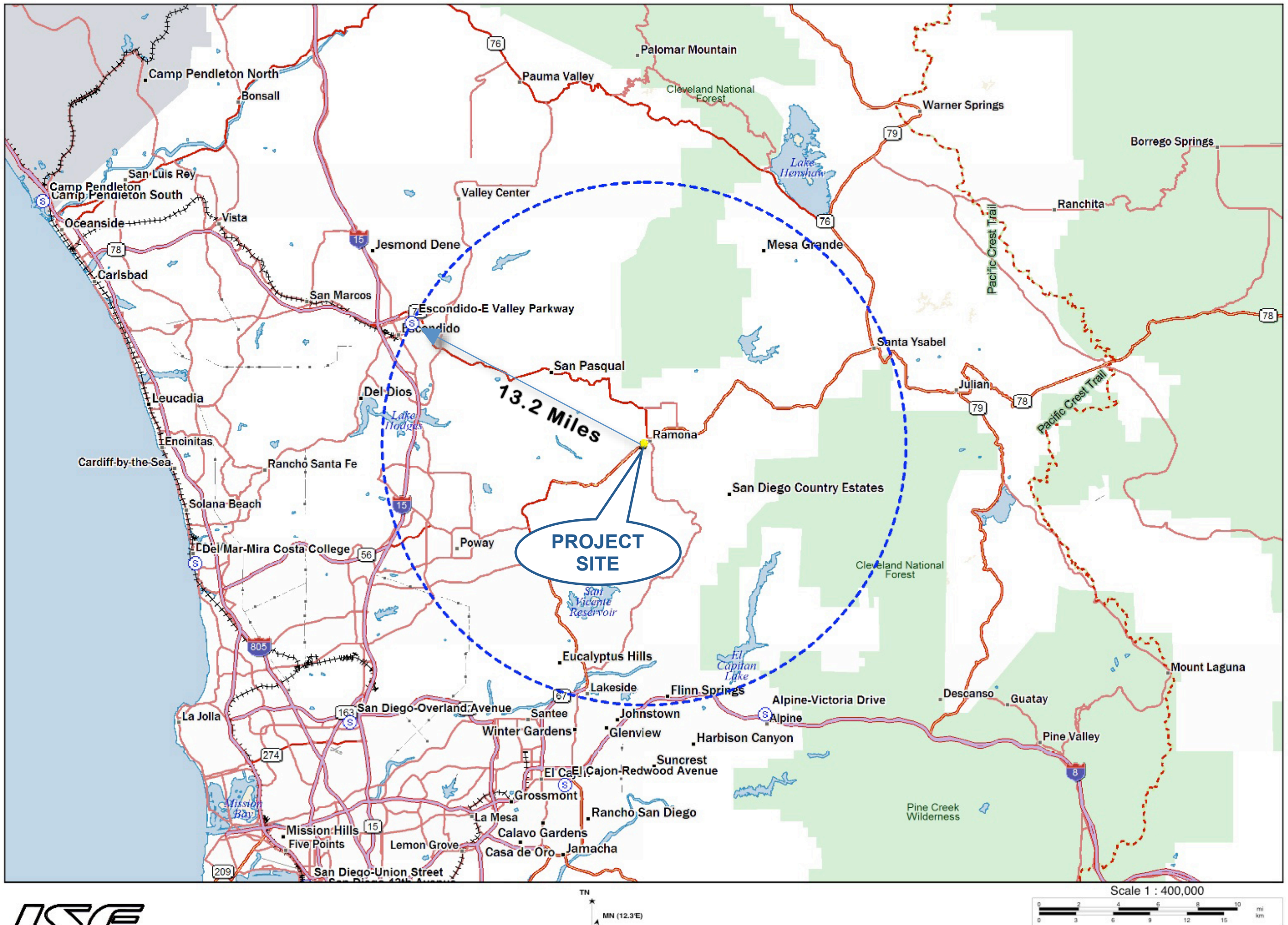

FIGURE 6: Ambient Air Quality Monitoring Station Location Map (ISE 6/09)

Construction Air Quality Modeling

Construction Vehicle Emission Modeling (CO, NO_x, SO_x, PM_{10}, $PM_{2.5}$, ROG)

Construction vehicle pollutant emission generators expected within the Ramona Branch Library site would consist predominately of diesel-powered grading and excavation equipment. The analysis methodology utilized in this report is based upon the EPA AP-42 source emissions report for the various classes of diesel construction equipment.[11]

The generation rates of typical equipment are identified below, in Table 2, and would constitute the baseline (unmitigated, or Tier 0) construction emission rates. Estimates of daily load factors (i.e., the amount of time during a day that any piece of equipment is under load) were based upon past ISE engineering experience with similar operations, and consultation with the project applicant.

TABLE 2: Baseline 'Tier 0' AP-42 Equipment Pollutant Generation Rates[12]

	Generation Rates (pounds per horsepower-hour)					
Equipment Class	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**ROG**
Track Backhoe	0.0150	0.0220	0.0020	0.0010	0.0009	0.0030
Dozer - D8 Cat	0.0150	0.0220	0.0020	0.0010	0.0009	0.0030
Hydraulic Crane	0.0090	0.0230	0.0020	0.0015	0.0014	0.0030
Loader/Grader	0.0150	0.0220	0.0020	0.0010	0.0009	0.0030
Side Boom	0.0130	0.0310	0.0020	0.0015	0.0014	0.0030
Water Truck	0.0060	0.0210	0.0020	0.0015	0.0014	0.0020
Concrete Truck	0.0060	0.0210	0.0020	0.0015	0.0014	0.0020
Concrete Pump	0.0110	0.0180	0.0020	0.0010	0.0009	0.0020
Dump/Haul Trucks	0.0060	0.0210	0.0020	0.0015	0.0014	0.0020
Paver / Blade	0.0070	0.0230	0.0020	0.0010	0.0009	0.0010
Roller / Compactor	0.0070	0.0200	0.0020	0.0010	0.0009	0.0020
Scraper	0.0110	0.0190	0.0020	0.0015	0.0014	0.0010

Emissions Reduction Mandates:

- The maximum CO emissions from Tier 2 equipment is 0.0082 pounds per horsepower-hour (lb/HP-hr) for equipment with power ratings between 50 and 175 HP, and 0.0057 lb/HP-hr for equipment with power ratings over 175 HP. Tier 3 ratings only apply between 50 to 750 HP and are identical to Tier 2 requirements. Tier 4 requirements (to be phased-in between 2008 and 2015) set a sliding scale on CO limits ranging from 0.0132 lb/HP-hr for small engines, to 0.0057 lb/HP-hr for engines up to 750 HP.
- The maximum NO_x and PM_{10} emissions from Tier 2 equipment are 0.0152 and 0.0003 lb/HP-hr regardless of the engine size. Tier 3 emissions were either not adopted or must meet the Tier 2 requirement. Tier 4 standards further reduce this level to 0.0006 lb/HP-hr for NO_x, and 0.00003 lb/HP-hr for PM_{10} for engines over 75 HP.

Table data sourced U.S. EPA AP-42 "Compilation of Air Pollutant Emission Factors", 9/85 through present. Ratings shown for full (100%) load factor.

[11] This tabulation provided by the EPA is the foundation of all construction emission programs available by CARB such as *OFFROAD* and the like. This equipment list would be classified as Tier Zero (Tier 0) equipment having none of the emissions control technologies required under the newer Tier 1 through 3 programs. This is the case for older construction equipment that is sometimes used on project sites.

[12] The $PM_{2.5}$ emission factors based upon the SCAQMD document, *"Final – Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds"*, 10/06. The correction factor for diesel equipment of this type is 0.920.

In cases where the required construction equipment aggregate does not comply with the applicable standards for a pollutant under examination, mitigation is imposed by requiring cleaner Tier 1 through 4 equipment, as required under the Federal Clean Air Act.[13,14] These maximum emission rates are shown as footnotes to Table 2 above for CO, NO_x and PM_{10} for Tier 2 or better (denoted as Tier 2+) equipment.[15] Additional recommendations for *"Blue Sky Series"* equipment will be made if the applicant cannot demonstrate strict Tier 2+ compliance.[16]

Finally, fine particulate dust generation ($PM_{2.5}$) from construction equipment was analyzed using the methodology identified in the SCAQMD document entitled, *"Methodology to Calculate Particulate Matter (PM) 2.5 and $PM_{2.5}$ Significance Thresholds"*. This approach, which utilizes the California Emission Inventory Development and Reporting System (CEIDARS) database, estimates $PM_{2.5}$ emissions as a fractional percentage of the aggregate PM_{10} emissions. For diesel construction equipment, the fractional emission factor is 0.920 $PM_{2.5}$ / PM_{10}.

Fugitive Dust Emission Modeling (PM_{10}, $PM_{2.5}$)

Fugitive dust generation from the proposed grading plan was analyzed using the methodology recommended in the SCAQMD CEQA Handbook guidelines for calculating 10-micron Particulate Matter (PM_{10}) due to earthwork. The analysis assumed low-wind speeds and active wet suppression control. Aggregate levels of PM_{10}, based upon the best available surface grading estimates, were calculated in pounds per day and compared to the applicable significance criteria shown in Table 1 above.

For surface grading operations, the fractional emission factor is 0.208 $PM_{2.5}$ / PM_{10} based upon the SCAQMD approach. For unpaved road travel, the fractional emission factor is 0.212 $PM_{2.5}$ / PM_{10}.

Combustion-Fired Health-Risk Emission Modeling (CO, NO_x, SO_x, PM_{10}, $PM_{2.5}$)

For the purposes of this analysis, construction vehicle pollutant emission generators would consist entirely of construction activities associated with rough-grading operations (which is the worst-case pollution emission scenario). The analysis methodology utilized in this report is based upon EPA and CARB guidelines for

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[13] *Source: US Code of Federal Regulations, Title 40, Part 89 [40 CFR Part 89].*

[14] In most cases the federal regulations for diesel construction equipment also apply in California, whose authority to set emission standards for new diesel engines is limited. The federal Clean Air Act Amendments of 1990 (CAA) preempt California's authority to control emissions from both new farm and construction equipment under 175 hp *[CAA Section 209(e)(1)(A)]* and require California to receive authorization from the federal EPA for controls over other off-road sources *[CAA Section 209 (e)(2)(A)]*.

[15] Again, for the purposes of mitigation, any construction equipment unable to comply with the applicable standards for a specific pollutant will be reanalyzed using the applicable Tier 2 equipment for engine sizes over 50 HP. These emission rates became mandatory for all equipment built starting 2001 or later (depending on engine size).

[16] The "Blue Sky Series" designation [40 CFR Part 89] is a voluntary program enacted by the USEPA requiring participating engine manufacturers to produce cleaner burning engines that are at least 40% better than current Tier 2 or 3 mandates. Engines with this designation are assumed by the EPA to produce *de facto compliance* with current and future air quality emissions standards. This program also exists for recreational and commercial marine diesel engines [40 CFR Part 94] and land-based non-road spark-ignition engines over 25 HP [40 CFR Part1048].

construction operations. Construction emissions were based upon the EPA AP-42 report generation rates for the various classes of diesel construction equipment.

A screening risk assessment of diesel-fired toxics from construction equipment was performed using the *SCREEN3* dispersion model developed by the EPA's Office of Air Quality Planning and Standards. The SCREEN3 model uses a Gaussian plume dispersion algorithm that incorporates source-related and meteorological factors to estimate pollutant concentration from continuous sources.

It is assumed that the pollutant does not undergo any chemical reactions, and that no other removal processes, such as wet or dry deposition, act on the plume during its transport from the source.[17] Using the concentrations obtained from the screening model, the diesel toxic risk can be defined as below:

$$Risk = \frac{F_{\text{wind}} \times EMFAC \times URF_{70\text{ year exposure}}}{Dilution}$$

where, *Risk* is the excess cancer risk (probability in one-million);

F_{wind} is the frequency of the wind blowing from the exhaust source to the receptor (the default value is 1.0);

EMFAC is the exhaust particulate emission factor (the level from the screening model);

$URF_{70\ year\ exposure}$ is the Air Resource Board unit risk probability factor (300 x 10^{-6}, or 300 in a million cancer risk per μg/m^3 of diesel combustion generated PM_{10} inhaled in a 70-year lifetime based upon *ARB 1999 Staff Report from the Scientific Review Panel (SRP) on Diesel Toxics*); and,

Dilution is the atmospheric dilution ratio during source-to-receptor transport (the default value of 1.0 assumes no dilution)

Given the above assumptions for wind frequency and atmospheric dilution ratio, and substituting the CARB recommended value for the unit risk probability factor gives the following expression:

$$Risk = \frac{1 \times EMFAC \times 300x10^{-6}}{1} = 300x10^{-6} \times EMFAC \quad \text{per person}$$

Thus, the percentage of risk of cancer to any given person being exposed to a concentration of pollution equal to EMFAC (in μg/m^3) over a continuous period of 70-years would be:

$$Risk(\%) = (300x10^{-6} \times EMFAC) \times 100 = 300x10^{-4} \times EMFAC \quad \text{per person}$$

Where it can be directly stated that a risk percentage of, say, 25% would indicate a 25% probability of inhaled cancer risk for the given level of exposure if consumed

[17] The methodology is based upon the *Industrial Source Complex (ISC3)* source dispersion approach as outlined in the *EPA-454/B-95-003b* technical document. This model is used within the State of California and is typically more restrictive than the ISC3 model.

continuously for a period of 70-years. A 50% probability would correspond to a 50:50 chance of inhaled cancer risk if consumed continuously for a period of 70-years, and so on.

For the construction-related diesel-fired toxics analysis, an area-source consistent in dimensions with the proposed grading area will be assumed. A simplified elevated terrain model (which is consistent with the area surrounding the project site) with no building downwash corrections and a worst-case wind direction was utilized.

VOC Emissions from Architectural Coatings Methodology

Volatile Organic Compound (VOC) emissions from architectural coatings such as painting will be analyzed within this report using the *SCAQMD CEQA Handbook Method A11-13* based upon an expected maximum total square-footage being painted per day. It will be assumed for the purposes of this assessment that all solvents used are water based with a maximum 50-percent by weight solids content and are capable of generating the maximum CARB level of 250 grams of VOC per liter regardless of the application method.

Aggregate Vehicle Emission Air Quality Modeling

Motor vehicles emissions associated with proposed future development were calculated by multiplying the appropriate emission factor (in grams per mile) times the estimated trip length and the total number of vehicles. Appropriate conversion factors were then applied to provide aggregate emission units of pounds per day. CARB estimates on-road motor vehicle emissions by using a series of models called the *Motor Vehicle Emission Inventory* (MVEI) Models.

Four computer models, which form the MVEI, are *CALIMFAC, WEIGHT, EMFAC*, and *BURDEN*.[18] They function as follows:

- The *CALIMFAC* model produces base emission rates for each model year when a vehicle is new and as it accumulates mileage and the emission controls deteriorate.
- The *WEIGHT* model calculates the relative weighting each model year should be given in the total inventory, and each model year's accumulated mileage.
- The *EMFAC* model uses these pieces of information, along with the correction factors and other data, to produce fleet composite emission factors.
- Finally, the *BURDEN* model combines the emission factors with county-specific activity data to produce to emission inventories.

For the current analysis, the *EMFAC 2007 Model v2.3* of the MVEI[19] was run using input conditions specific to the San Diego County air basin to predict both operational vehicle emissions from the project, as well as powered haulage emissions

[18] The module named *EMFAC* should not be confused with the entire EMFAC 2007 program itself (which calls the subroutines *CALIMFAC, WEIGHT, EMFAC, and BURDEN* to determine the final emission inventory for a particular area).

[19] This is the most current CARB emissions model approved for use within the State of California.

due to material export based upon the estimated near-term year 2013 project completion and operational date. The aggregate emission factors from the CARB *EMFAC 2007* model are provided as an attachment at the end of this report.

A mix ratio consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used. This consisted of the following air standard Otto-Cycle engine vehicle distribution percentages:

Light Duty Autos = 69.0	Light Duty Trucks = 19.4
Medium Duty Trucks = 6.4	Heavy Duty Trucks = 4.7
Buses = 0.0	Motorcycles = 0.5

Fine particulate dust generation ($PM_{2.5}$) from motor vehicle operation was analyzed using the methodology identified by SCAQMD[20]. This approach, which utilizes the *California Emission Inventory Development and Reporting System* (CEIDARS) database, estimates $PM_{2.5}$ emissions as a fractional percentage of the aggregate PM_{10} emissions. For operational vehicular traffic, the fractional emission factor is 0.998 $PM_{2.5}$ / PM_{10} based upon the SCAQMD approach.

Vehicular CO / NO_x / PM_{10} / $PM_{2.5}$ Conformity Assessment

A hotspot conformity analysis was performed on all project-related roadway segments using the *California Line Source Emissions Model Version 4* (CALINE4)[21] air dispersion model methodology in order to quantify near term cumulative plus project pollutant concentrations within this portion of the project air basin. CALINE4 is the accepted line source dispersion model within the State of California.

For the hotspot analysis, near-term year 2013 plus project traffic volumes for Scenarios A through D were used based upon values provided by the project traffic engineer.[22] Worst case mean running speeds along SR 67 through the Town of Ramona of 45 MPH were used for all potentially impacted roadway segments utilizing the aforementioned Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol mix ratios per *EMFAC 2007*.

This produced the following worst-case running emission factors, which can be seen in the last column of the EMFAC output:

CO = 2.319 grams/mile

NO_x = 0.670 grams/mile

PM_{10} = 0.022 grams/mile

[20] This is detailed in the document entitled, *"Final Methodology to Calculate Particulate Matter (PM) 2.5 and $PM_{2.5}$ Significance Thresholds"*, published by SCAQMD.

[21] CALINE4 is a Gaussian line dispersion model, developed by Caltrans, which is used to predict localized vehicle emissions from mobile sources. The model uses source strength, meteorological data, and site geometry to predict pollutant concentrations within 1,500 feet of the roadway.

[22] Source: *Traffic Impact Analysis – Ramona Library, Ramona, CA – Linscott, Law & Greenspan, 5/14/09.*

Worst-case wind speed, aggregate emissions class data, and meteorological assumptions were created and run for various traffic scenarios. The peak hour traffic volume was calculated at worst-case 10-percent of the daily ADT.

CO concentrations were sampled adjacent to the multifamily project area by ISE using a Quest AQ5001 Pro air quality monitor. The results indicated maximum CO concentration levels of slightly less than 1.0 ppm, which is consistent with regionally monitored levels. Ambient PM_{10} levels were measured using a HAZ-DUST 1000 portable direct reading particulate monitor. Background mass concentration readings of up to 0.001 milligrams per cubic meter (mg/m^3) were indicated.

Levels for NO_x precursors (such as NO, NO_2, and O_3) were taken at 0.01, 0.08, and 0.12 ppm respectively, which are consistent with current ambient (worst-case) monitoring station levels. The NO_2 photolysis rate was taken at a default atmospheric solar value of 0.004/sec.[23]

The CALINE4 solution space results for these input assumptions are provided as attachments to this report. The regression results are shown following each plot.

Fixed Source Emissions Modeling

Fixed emission sources under the CEQA analysis context within this report would consist predominantly of small gasoline engines used with landscaping equipment, and emissive sources from natural gas powered appliances (such as hot water heaters, etc.) associated with operation of the library facility. An analysis of these emission sources, consistent with the *SCAQMD CEQA Handbook* and current EPA protocols, will be quantified with the total aggregate emission levels identified at the end of this report.[24]

[23] Photolysis is the process by which a chemical compound undergoes a change in valence as the result of the absorption of a photon (i.e., light). This process is also called photodecomposition, photochemical reaction, or photo-oxidation.

[24] The analysis presented herein uses the same methodology identified in the CARB *URBEMIS* model, although providing a greater level of detail. The technical details are provided in the SCAQMD CEQA Handbook Tables A9-12 and A9-12A, -B as well as the EPA's AP-42 emission generation document previously referenced.

FINDINGS

Existing Climate Conditions

The climate within the region surrounding the proposed development site is characterized by warm, dry summers and mild, wet winters; it is dominated by a semi-permanent high-pressure cell located over the Pacific Ocean. This high-pressure cell maintains clear skies over the air basin for much of the year. It also drives the dominant onshore circulation, as can be seen in Figure 7 on the following page, and helps to create two types of temperature inversions, subsidence and radiation, that contribute to local air quality degradation.

Subsidence inversions occur during the warmer months, as descending air associated with the Pacific high-pressure cell meets cool marine air. The boundary between the two layers of air represents a temperature inversion that traps pollutants below it. Radiation inversion typically develops on winter nights, when air near the ground cools by radiation, and the air aloft remains warm. A shallow inversion layer that can trap pollutants is formed between the two layers.

Occasionally during the months of October through February, offshore flow becomes a dominant factor in the regional air quality. These periods, known as *"Santa Ana Conditions"*, are typically maximal during the month of December with wind speeds from the north to east approaching 35 knots, and gusting to over 50 knots. This air movement is caused by clockwise pressure circulation over the Great Basin (i.e., the high plateau east of the Sierra Mountains and west of the Rocky Mountains, including most of Nevada and Utah), which results in significant downward air motion towards the ocean. Stronger Santa Ana winds can have gusts greater than 60 knots over widespread areas and gusts greater than 100 knots in canyon areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of onshore sea breezes. The overall result is a noticeable degradation in local air quality.

Finally, in the area of the proposed project site, the maximum and minimum average temperatures are 91° F and 37° F, respectively.[25] Precipitation in the area averages 16.4 inches annually, 90 percent of which falls between November and April. The prevailing wind direction is from the west-northwest, with an annual mean speed of eight to 10 miles per hour. Sunshine is usually plentiful in the proposed project area, but night and morning cloudiness is common during the spring and summer. Fog can occur occasionally during the winter.

[25] Source: *National Weather Service (NWS) / National Oceanographic and Atmospheric Administration (NOAA), 2009.*

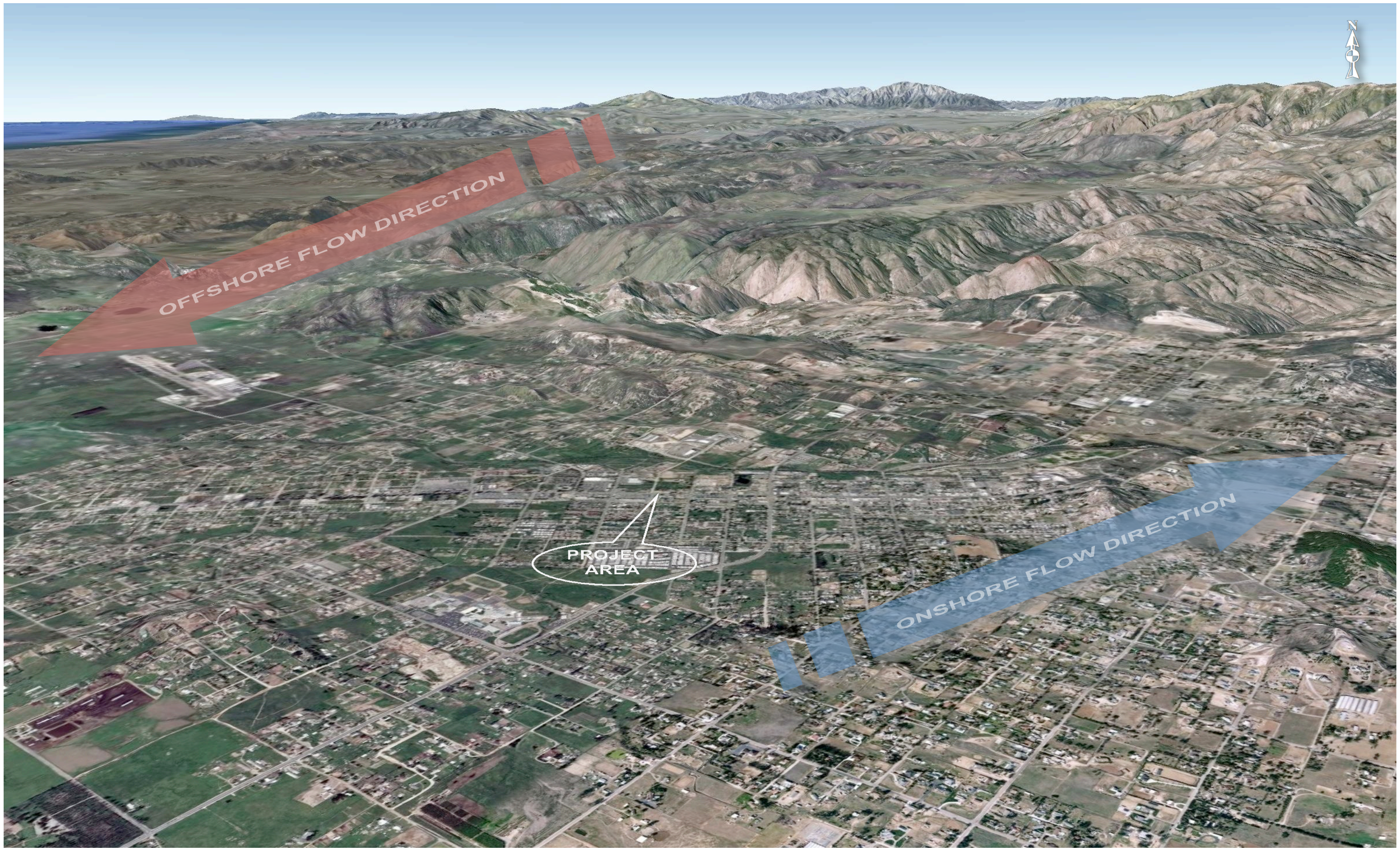

FIGURE 7: Project Air Basin Aerial Map (Google Earth 2009, ISE 6/09)

Existing Air Quality Levels

Tables 3a through –f, starting below, provide a summary of the highest pollutant levels recorded at the previously identified monitoring stations for the last year available (2008), based upon the latest data from the CARB Aerometric Data Analysis and Management (ADAM) System database.

The project site is located in the northwestern coastal portion of the San Diego Air Basin. The Basin continues to have a transitional-attainment status of federal standards for Ozone (O_3). The Basin is either in attainment or unclassified for federal standards of CO, SO_2, NO_2, PM_{10}, and lead.

San Diego County areas in general are also in attainment of state air quality standards for all pollutants with the exception of O_3 and PM_{10}. Furthermore, factors affecting ground level pollutant concentrations include the rate at which pollutants are emitted to the atmosphere, the height from which they are released, and topographic and meteorological features. Given these factors, the Escondido station reported exceedances for O_3 and PM_{10}. All other criteria pollutants were within both federal and state standards or not monitored due to this reason.[26]

TABLE 3a: Escondido Monitoring Station – Maximum Hourly O_3 Levels

Air Resources Board

iADAM

Highest 4 Daily Maximum Hourly Ozone Measurements
Escondido-E Valley Parkway

FAQs

Year:	2006		2007		2008	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Jul 22	0.108	Aug 31	0.094	Jun 20	0.116
Second High:	Jun 3	0.099	Sep 1	0.094	Jul 5	0.111
Third High:	Sep 1	0.095	Jun 13	0.090	Jun 18	0.107
Fourth High:	Jun 25	0.091	Sep 2	0.085	Jul 4	0.105
# Days Above State Standard:		3		0		9
California Designation Value:		0.10		0.10		0.11
Expected Peak Day Conc.:		0.098		0.095		0.105
# Days Above Nat'l Standard:		*0*		*0*		*0*
National Design Value:		*0.098*		*0.095*		*0.107*
Year Coverage:		93		95		91

Go Backward One Year | New Top 4 Summary | Go Forward One Year

Notes: All concentrations are expressed in parts per million.
The national 1-hour ozone standard was revoked in June 2005 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics*.
State exceedances are shown in yellow. Exceedances of the revoked national 1-hour standard are shown in orange.
An exceedance is not necessarily a violation.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period.
* There was insufficient (or no) data available to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

[26] Monitoring for lead was discontinued entirely in 1998.

TABLE 3b: Escondido Monitoring Station – Maximum Eight Hour O_3 Levels

Air Resources Board

iADAM

Highest 4 Daily Maximum 8-Hour Ozone Averages
Escondido-E Valley Parkway

FAQs

Year:	2006		2007		2008	
	Date	8-Hr Average	Date	8-Hr Average	Date	8-Hr Average
National:						
First High:	Jul 22	0.096	Sep 1	0.077	Jun 20	0.098
Second High:	Jun 3	0.089	Aug 31	0.076	Jun 19	0.093
Third High:	Jun 25	0.082	Sep 3	0.076	Jun 21	0.093
Fourth High:	Sep 1	0.078	Sep 2	0.075	Jul 5	0.089
California:						
First High:	Jul 22	0.097	Sep 1	0.078	Jun 20	0.099
Second High:	Jun 3	0.090	Sep 3	0.077	Jun 21	0.094
Third High:	Jun 25	0.083	Aug 31	0.076	Jun 19	0.093
Fourth High:	Sep 1	0.078	Sep 2	0.075	Apr 26	0.089
National:						
# Days Above '08 Nat'l Std.:		6		3		13
'08 Nat'l Std. Design Value:		0.073		0.074		0.080
National Year Coverage:		96		96		95
California:						
# Days Above State Standard:		11		5		23
California Designation Value:		0.085		0.083		0.094
Expected Peak Day Conc.:		0.084		0.084		0.093
California Year Coverage:		93		95		91
	Go Backward One Year		New Top 4 Summary		Go Forward One Year	

Notes: All averages are expressed in parts per million.
National exceedances are shown in orange. State exceedances are shown in yellow.
An exceedance is not necessarily a violation.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period.
* There was insufficient (or no) data available to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

TABLE 3c: Escondido Monitoring Station – Maximum Daily PM_{10} Levels

Air Resources Board

iADAM

Highest 4 Daily PM10 Measurements

Escondido-E Valley Parkway

FAQs

Year:	2006		2007		2008	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Dec 25	51.0	Oct 27	68.0	Jan 1	82.0
Second High:	Dec 31	43.0	Nov 2	57.0	Jul 5	45.0
Third High:	Feb 10	42.0	Nov 24	48.0	Feb 18	40.0
Fourth High:	Dec 7	41.0	Oct 21	46.0	Jun 17	35.0
California:						
First High:	Dec 25	52.0	Oct 27	68.0	Jan 1	84.0
Second High:	Dec 31	44.0	Nov 2	57.0	Jul 5	44.0
Third High:	Feb 10	43.0	Nov 24	49.0	Feb 18	41.0
Fourth High:	Dec 7	41.0	Oct 21	45.0	Jun 17	34.0
Measured:						
# Days Above Nat'l Standard:		0		0		0
# Days Above State Standard:		1		2		1
Estimated:						
3-Yr Avg # Days Above Nat'l Std:		0.0		0.0		*
# Days Above Nat'l Standard:		0.0		0.0		*
# Days Above State Standard:		5.8		11.5		*
State 3-Yr Maximum Average:		27		27		27
State Annual Average:		24.2		26.9		*
National 3-Year Average:		*25*		*25*		*25*
National Annual Average:		*24.1*		*26.7*		*24.7*
Year Coverage:		100		99		45

Go Backward One Year | New Top 4 Summary | Go Forward One Year

Notes: All concentrations are expressed in micrograms per cubic meter.
The national annual average PM10 standard was revoked in December 2006 and is no longer in effect. Statistics related to the revoked standard are shown in *italics* or *italics*.
State exceedances are shown in yellow. National exceedances are shown in orange.
An exceedance is not necessarily a violation.
Statistics may include data that are related to an exceptional event.
State and national statistics may differ for the following reasons:
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods.
State and national statistics may therefore be based on different samplers.
State statistics for 1998 and later are based on *local* conditions (except for sites in the South Coast Air Basin, where State statistics for 2002 and later are based on *local* conditions).
National statistics are based on *standard* conditions.
State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
Measurements are usually collected every six days. Measured days counts the days that a measurement was greater than the level of the standard; Estimated days mathematically estimates how many days concentrations would have been greater than the level of the standard had each day been monitored.
3-Year statistics represent the listed year and the 2 years before the listed year.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* There was insufficient (or no) data available to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

TABLE 3d: Escondido Monitoring Station – Maximum Daily $PM_{2.5}$ Levels

Air Resources Board

iADAM

Highest 4 Daily PM2.5 Measurements
Escondido-E Valley Parkway

FAQs

Year:	2006		2007		2008	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Dec 25	40.6	Oct 23	126.2	Jul 4	38.1
Second High:	Dec 24	34.7	Oct 22	124.0	Jul 3	32.1
Third High:	Jan 30	31.8	Oct 28	52.7	Jul 5	31.3
Fourth High:	Feb 5	31.6	Nov 6	48.5	Jan 1	30.6
California:						
First High:	Dec 25	40.6	Oct 23	151.0	Jan 11	37.3
Second High:	Dec 24	34.7	Oct 22	143.4	Jan 1	35.7
Third High:	Jan 30	31.8	Oct 28	59.4	Jul 5	32.6
Fourth High:	Feb 5	31.6	Nov 6	48.5	Jan 12	30.9
Estimated Days > '06 Nat'l 24-Hr Std:		1.1		11.4		*
Measured Days > '06 Nat'l 24-Hr Std:		1		11		1
'06 Nat'l 24-Hr Std Design Value:		*		*		*
'06 Nat'l 24-Hr Std 98th Percentile:		28.3		37.7		*
National Annual Std Design Value:		*		*		*
National Annual Average:		11.5		13.3		*
State Ann'l Std Designation Value:		14		13		13
State Annual Average:		11.5		13.3		*
Year Coverage:		96		96		18

Go Backward One Year | New Top 4 Summary | Go Forward One Year

Notes: All concentrations are expressed in micrograms per cubic meter.
State exceedances are shown in yellow. National exceedances are shown in orange.
An exceedance is not necessarily a violation.
State and national statistics may differ for the following reasons:
State statistics are based on California approved samplers, whereas national statistics are based on samplers using federal reference or equivalent methods.
State and national statistics may therefore be based on different samplers.
State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* There was insufficient data available throughout the year to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

TABLE 3e: Escondido Monitoring Station – Maximum Eight Hour CO Levels

Air Resources Board
iADAM

Highest 4 Daily Maximum 8-Hour Carbon Monoxide Averages
Escondido-E Valley Parkway
FAQs

Year:	2006		2007		2008	
	Date	Measurement	Date	Measurement	Date	Measurement
National:						
First High:	Dec 25	3.61	Dec 25	3.19	Jan 2	2.81
Second High:	Dec 5	3.26	Dec 24	3.17	Jan 2	2.44
Third High:	Dec 4	2.99	Jan 18	2.79	Jan 1	2.40
Fourth High:	Dec 7	2.93	Dec 4	2.75	Jan 3	2.39
California:						
First High:	Dec 24	3.61	Dec 25	3.19	Jan 2	2.81
Second High:	Dec 5	3.26	Dec 23	3.17	Jan 1	2.44
Third High:	Dec 4	2.99	Jan 18	2.79	Jan 3	2.39
Fourth High:	Dec 6	2.93	Dec 3	2.75	Feb 8	2.28
# Days Above Nat'l Standard:		0		0		0
# Days Above State Standard:		0		0		0
Year Coverage:		97		98		51
	Go Backward One Year		New Top 4 Summary		Go Forward One Year	

Notes: All averages are expressed in parts per million.
State exceedances are shown in yellow. National exceedances are shown in orange.
An exceedance is not necessarily a violation.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period.
* There was insufficient (or no) data available to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

TABLE 3f: Escondido Monitoring Station – Maximum Hourly NO_2 Levels

Air Resources Board
iADAM

Highest 4 Daily Maximum Hourly Nitrogen Dioxide Measurements
Escondido-E Valley Parkway
FAQs

Year:	2006		2007		2008	
	Date	Measurement	Date	Measurement	Date	Measurement
First High:	Nov 22	0.071	Nov 28	0.072	Oct 27	0.081
Second High:	Oct 27	0.070	Oct 24	0.071	Oct 26	0.078
Third High:	Nov 17	0.064	Jul 25	0.067	Oct 28	0.078
Fourth High:	Nov 7	0.062	Feb 3	0.065	Feb 12	0.073
# Days Above State Standard:		0		0		0
Annual Average:		0.017		0.016		*
Year Coverage:		90		92		69
	Go Backward One Year		New Top 4 Summary		Go Forward One Year	

Notes: All concentrations are expressed in parts per million.
State exceedances are shown in yellow. National exceedances are shown in orange.
An exceedance is not necessarily a violation.
Year Coverage indicates the extent to which available monitoring data represent the time of the year when concentrations are expected to be highest. 0 means that data represent none of the high period; 100 means that data represent the entire high period. A high Year Coverage does not mean that there was sufficient data for annual statistics to be considered valid.
* There was insufficient (or no) data available to determine the value.

Source: CARB ADAM Ambient Air Quality Inventory – 6/09

Project Construction Emission Findings

The proposed Ramona Branch Library project site would be mass graded over the course of approximately one month. Given this, the following construction findings were indicated.

Construction Vehicle Emissions (CO, NO_x, SO_x, PM_{10}, $PM_{2.5}$, ROG)

The estimated Tier 0 diesel exhaust emissions are provided in Table 4a below for the estimated rough grading and onsite powered haulage phase of project construction.[27] It is anticipated that rough grading of the site would move approximately one-foot of surface material on average, yielding an approximate 15,000 cubic yards of earthwork.[28] Remedial grading, required to prepare final development pads, would occur following rough grading and would be of a far lesser amount.

TABLE 4a: Predicted Construction Emissions – Rough Grading / Hauling (Tier 0 Baseline)

					Aggregate Emissions in Pounds / Day					
Equipment Type	**Qty. Used**	**HP**	**Daily Load Factor (%)**	**Duty Cycle (Hrs. / day)**	**CO**	**NOx**	**SOx**	**PM_{10}**	**$PM_{2.5}$**	**ROG**
Dozer - D8 Cat	1	300	50	8	10.8	27.6	2.4	1.8	1.7	3.6
Loader	1	150	50	8	9.0	13.2	1.2	0.6	0.6	1.8
Water Truck	1	200	50	4	2.4	8.4	0.8	0.6	0.6	0.8
Dump Trucks	2	300	20	8	5.8	20.2	1.9	1.4	1.3	1.9
Scrapers	1	450	75	8	29.7	51.3	5.4	4.1	3.8	2.7
				Total for this Construction Task (Σ):	**57.7**	**120.7**	**11.7**	**8.5**	**8.0**	**10.8**
				Significance Threshold (SDAPCD)	**550**	**250**	**250**	**100**	**55**	**75**

Based upon the findings, no significant air quality impacts are expected due to construction grading operations. Additionally, Table 4b, below, identifies the anticipated

[27] The typical construction phases for land development, which are independent of the specific project being developed, are as follows:

Construction Phase	Work Performed	Typical Tasks
Rough Grading	Site clearing, grubbing, and general pad and road alignment formation.	Site mobilization, scraper hauls/finishing, and additional site finishing work.
Underground Utility Construction	General trench-work, pipe laying with associated base material and cover, and ancillary earthwork required to facilitate placement of sewer lift stations, manholes, etc.	This is typically performed as a single task.
Paving Activities	Movement of any remaining material as well as necessary curb and gutter work, road base material placement and blacktop.	This is typically performed as a single task.

[28] This is a worst-case assumption since final grading numbers are currently not available. The project will, in all likelihood, have final grading levels far less than this value. Nonetheless, this level serves as an upper bound on grading levels for the purposes of analysis within this report.

emissions due to underground utility construction and paving activities. As can be seen, no significant impact is expected from these smaller operations using the baseline Tier 0 emissions inventory.

TABLE 4b: Predicted Construction Emissions – Underground Utilities / Paving (Tier 0 Baseline)

					Aggregate Emissions in Pounds / Day					
Equipment Type	**Qty. Used**	**HP**	**Daily Load Factor (%)**	**Duty Cycle (Hrs. / day)**	**CO**	**NOx**	**SOx**	**PM_{10}**	**$PM_{2.5}$**	**ROG**
Underground Utility Construction										
Track Backhoe	1	150	50	6	6.8	9.9	0.9	0.5	0.5	1.4
Loader	1	150	50	6	6.8	9.9	0.9	0.5	0.5	1.4
Concrete Truck	2	250	25	0.5	0.4	1.3	0.1	0.1	0.1	0.1
Concrete Pump	1	50	25	8	1.1	1.8	0.2	0.1	0.1	0.2
Dump/Haul Trucks	4	300	45	4	13.0	45.4	4.3	3.2	2.9	4.3
				Total for this Construction Task (Σ):	**28.1**	**68.3**	**6.4**	**4.4**	**4.1**	**7.4**
Surface Paving Activities										
Skid Steer Cat	2	150	50	6	13.5	19.8	1.8	0.9	0.8	2.7
Dump/Haul Trucks	10	300	45	0.5	4.1	14.2	1.4	1.0	0.9	1.4
Paver	2	150	35	8	5.9	19.3	1.7	0.8	0.7	0.8
Roller	2	150	35	8	5.9	16.8	1.7	0.8	0.7	1.7
				Total for this Construction Task (Σ):	**29.4**	**70.1**	**6.6**	**3.5**	**3.1**	**6.6**
				Significance Threshold (SDAPCD)	**550**	**250**	**250**	**100**	**55**	**75**

Fugitive Dust Emission Levels (PM_{10}, $PM_{2.5}$)

Construction activities are also a source of fugitive dust emissions that may have a substantial, but temporary, impact on local air quality. These emissions are typically associated with land clearing, excavating, and construction of a proposed action. Substantial dust emissions also occur when vehicles travel on paved and unpaved surfaces, and haul trucks lose material.

Dust emissions and impacts vary substantially from day to day, depending on the level of activity, the specific operation being conducted, and the prevailing meteorological conditions. Wet dust suppression techniques, such as watering and/or applying chemical stabilization, would be used during construction to suppress the fine dust particulates from leaving the ground surface and becoming airborne through the action of mechanical disturbance or wind motion.

Construction grading operations at the proposed Ramona Branch Library development are anticipated as being no greater than a worst-case 15,000 cubic-yards (cy) of material moved over an anticipated 30-day earthwork period. Remedial grading would occur for final pad and street formation and would be minimal compared to this value.

For alluvium-type material, the project earthwork would have a total working weight of,

$$Working\ Weight = 15{,}000\ cubic - yards \times \frac{1.3\ tons}{cubic - yard} = 19{,}500\ tons$$

Out of the total quantity identified above, it is estimated that roughly 75-percent of the working weight would be capable of generating PM_{10} due to the presence of hard rock and non-alluvium conditions. Thus, for the purposes of analysis, the working weight of earthwork material capable of generating some amount of PM_{10} would be 14,625 tons. Thus, the average mass grading earthwork movement per day over the total 30 working days would be 487.5 tons/day.

Following the analysis procedure identified in the *SCAQMD CEQA Handbook* for PM_{10} emissions from fugitive dust gives the following semi-empirical relationship for aggregate respirable dust generation,

$$PM_{10} = 0.00112 \times \left[\frac{\left(\frac{WS}{5}\right)^{1.3}}{\left(\frac{SMC}{2}\right)^{1.4}} \right] \times ET$$

where, PM_{10} = Fugitive dust emissions in pounds,
WS = Ambient wind speed,
SMC = Surface Moisture Content, generally defined as the weight of the water (W_w) divided by the weight of the soil (W_s) as measured at the surface in grams per gram.
ET = Earthwork Tonnage moved per day,

Substituting a minimum SMC value of 0.25 (which is extremely conservative for an ambient dirt/sand condition) and a maximum credible wind speed scenario of 12 MPH (WS = 12), gives the following result,

$$PM_{10} = 0.00112 \times \left[\frac{\left(\frac{12}{5}\right)^{1.3}}{\left(\frac{0.25}{2}\right)^{1.4}} \right] \times 487.5 = 31.3$$

or, a level of 31.3 pounds of PM_{10} generated per day. It should be noted that surface wetting will be utilized during all phases of earthwork operations at a minimum level of three times per day; thus a control efficiency of 34% to 68% reduction in fugitive dust can be applied per the SCAQMD methodology.

Assuming a median 60% control efficiency, due to the aforementioned watering yields,

$$PM_{10} = (1 - 0.6) \times 31.3 = 12.5$$

or a total fugitive dust generated load of 12.5 pounds per day. This level is far below the 100 pounds per day threshold established by SDAPCD. Therefore, no impacts are expected from this phase of construction. The commensurate $PM_{2.5}$ level would be 2.6 pounds per day, which is also below the proposed threshold of significance of 55 pounds per day for this pollutant.

Unpaved road travel due to construction activities is also unknown at this time. For the purposes of analysis, it will be assumed that contractors' vehicles moving onsite would traverse a total of 25 miles per day (VMT) during the 180 days of earthwork and site preparation.

Substituting the applicable project values of VMT = 25, SLP = 6.0 (sand/gravel road with watering), MVS = 15 miles per hour, MVW = 3 tons (gross vehicular weight), NW = 4 wheels (average number of wheels), and RD[29] = 44.0 gives the following result,

$$PM_{10} = 25 \times \left[2.1 \left(\frac{6}{12} \right) \left(\frac{15}{30} \right) \left(\frac{3}{3} \right)^{0.7} \left(\frac{4}{4} \right)^{0.5} \left(\frac{365 - 44}{365} \right) \right] = 11.5$$

or, a level of approximately 11.5 pounds of PM_{10} generated per day. This activity alone would not generate a significant impact. The commensurate $PM_{2.5}$ level would be 2.4 pounds per day, which is also below the proposed threshold of significance identified above.

Combustion-Fired Health-Risk Emission Levels (CO, NO_x, SO_x, PM_{10}, $PM_{2.5}$)

Onsite construction equipment was found to generate worst-case daily pollutant levels during the rough grading phase. These emissions are assumed to occur over any given 24-hour day (thereby providing an upper bound on expected emission concentrations) and direct comparison with CAAQS standards.

Although all stable criteria pollutants are provided, it should be noted that for cancer-risk potential, only combustion-fired PM_{10} particulates are considered. This methodology essentially applies all of the diesel emissions over this working area and provides a worst-case assessment of the impacts to sensitive receptors.

The proposed Ramona Branch Library project site has a maximum project footprint of roughly 318,859 square-feet (29,623 m^2) based upon data obtained from the project site plans and the fact that the entire 7.32-acre site will be graded at once. The

[29] Based upon U.S. Weather Service average precipitation year data within San Diego County.

aggregate Tier 0 mitigated emission rates for the various criteria pollutants, in grams per second and grams per square-meter (m^2) per second, are shown below in Table 5.[30] The expected combustion-fired construction emission concentrations from the *SCREEN3* modeling are shown in Table 6. The output model results are provided as an attachment to this report.

TABLE 5: Predicted Onsite Diesel-Fired Construction Emission Rates (Tier 0)

Criteria Pollutant	Max Daily Emissions (pounds)	Daily Site Emission Rates (grams/second)	Average Area Emission Rates (grams/m^2/second)
CO	57.7	0.3029	1.0226E-05
NO_x	120.7	0.6337	2.1391E-05
SO_x	11.7	0.0614	2.0735E-06
PM_{10}	**8.5**	**0.0446**	**1.5064E-06**
$PM_{2.5}$	8.0	0.0420	1.4178E-06

Total averaging time is 24 hours x 60 minutes/hour x 60 seconds/minute = 86,400 seconds per CAAQS standards.

The area emission rates are shown in scientific notation and are expressed in the form of *mantissa-exponent* to base 10.

One pound-mass = 453.592 grams.

TABLE 6: SCREEN3 Predicted Diesel-Fired Emission Concentrations

Criteria Pollutant	Pollutant Concentration ($\mu g/m^3$)	Pollutant Concentration (ppm)	Pollutant Risk Probability (percent risk per person for 70-year exposure)	Significant?
CO	104.40	0.0908	n/a	**No**
NO_x	218.30	0.1161	n/a	**No**
SO_x	21.16	0.0081	n/a	**No**
PM_{10}	**15.37**	**- -**	**0.461%**	**No**
$PM_{2.5}$	14.14	- -	n/a	**No**

Diesel risk calculation based upon ARB 1999 Staff Report from the Scientific Review Panel (SRP) on Diesel Toxics inhaled in a 70-year lifetime.

Conversion Factors (approximate):

CO: 1 ppm = 1,150 $\mu g/m^3$ @ 25 deg-C STP, NO_x: 1 ppm = 1,880 $\mu g/m^3$ @ 25 deg-C STP
SO_x: 1 ppm = 2,620 $\mu g/m^3$ @ 25 deg-C STP, PM_{10} and $PM_{2.5}$: 1 ppm = 1 g/m^3 (solid)

$PM_{2.5}$ levels based upon the CEIDARS database fractional emission factor for diesel construction equipment of 0.920 $PM_{2.5}$ / PM_{10}.

Based upon the model results, all criteria pollutants were below the recommended health risk level with a PM_{10} risk probability of 0.461% (or 46.1 one-hundredths of a percent risk per 70-year exposure duration, assuming the

[30] As a required input parameter for the SCREEN3 model.

implementation of T-BACT). Given this, no significant carcinogenic impact potential is expected due to proposed grading operations.

Additionally, the analysis identified a worst-case PM_{10} level of 15.4 $\mu g/m^3$ occurring at a distance of 531 meters (1,742 feet) from the project site. This pollutant concentration is far below the California Ambient Air Quality Standard (CAAQS) of 50 $\mu g/m^3$ established by the State for any given 24-hour exposure period. This predicted diesel-fired PM_{10} dispersion pattern as a function of distance from the site can be seen below in Figure 8. No cumulative contribution from the site would be physically possible beyond the extents identified in this figure.[31]

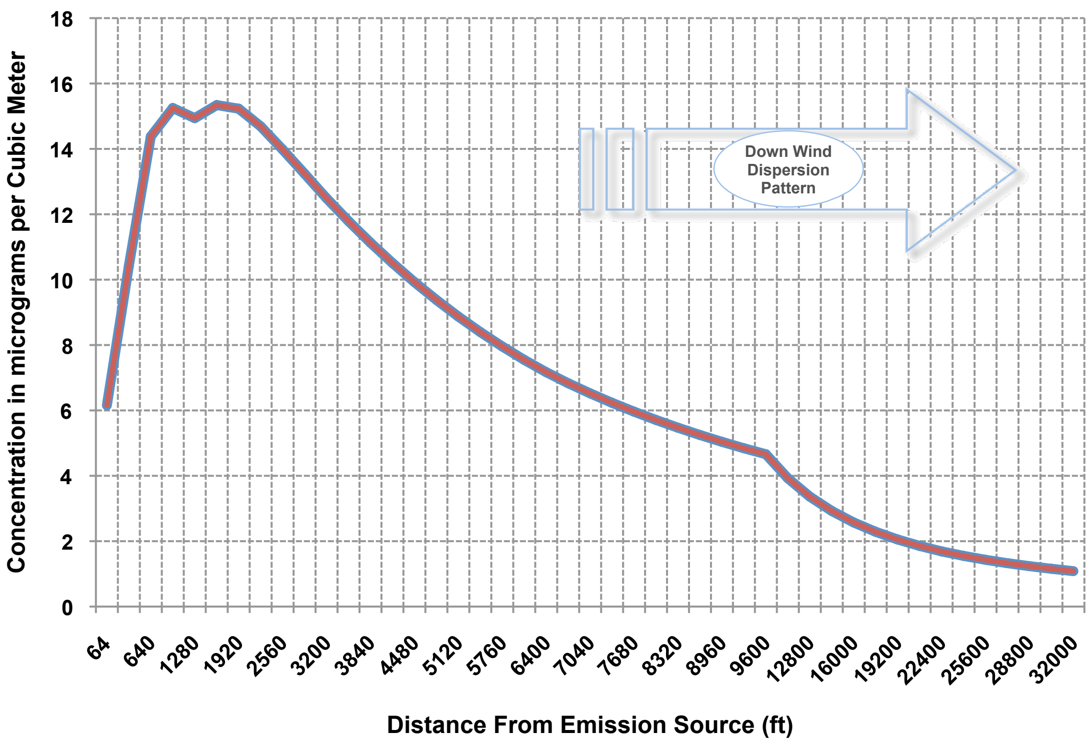

FIGURE 8: Predicted Combustion-Fired Diesel PM_{10} Dispersion Pattern (ISE 6/09)

Finally, anticipated diesel-fired $PM_{2.5}$ levels would not be expected to exceed 14.1 $\mu g/m^3$, which are also below the Federal NAAQS 24-hour threshold of 35 $\mu g/m^3$ (there are no State thresholds for this pollutant). No cumulative contribution of $PM_{2.5}$ from the site would be physically possible due to the aforementioned reasons cited above.

[31] Which, assuming a standard Gaussian distribution, would yield an effective no impact distance of 6,968 feet (or 1.32 miles).

VOC Emission Potential from Architectural Coatings

Following the analysis methods identified in the *SCAQMD CEQA Handbook* for VOC emissions due to architectural coatings gives the following semi-empirical relationship for aggregate emission levels,

$$VOC_{arch} = \left[\frac{WT \times A}{1000}\right] \times CT$$

where, VOC = Total pounds of Volatile Reactive Organic Compounds per day,
WT = Specific VOC weight in pounds per mil per 1,000 square-foot application area,
A = Total exterior and/or interior area to be coated in square-feet,
CT = Required paint thickness in mils.

Due to the programmatic nature of the project design at this point, exact painting quantities are unknown. It is expected that the proposed Ramona Branch Library contractors could completely finish paint[32] a maximum of 5,000 square-feet (denoted as A) of usable surface area every day (denoted as ΔT).

This yields the following modified expression:

$$VOC_{arch} = \left[\frac{\frac{WT}{\Delta T} \times A}{1000}\right] \times CT$$

Substituting the applicable unmitigated project values of WT = 7.12 pounds of VOC per 1,000 square-feet of painted area (per SCAQMD Table A11-13-C), ΔT = 1 day, A = 5,000 square-feet, CT = 2.0 mils (as the default value for two fast passes using an HVLP[33]) gives the following result,

$$VOC_{arch} = \left[\frac{7.12 \times 5{,}000}{1000 \times 1}\right] \times 2.0 = 71.2$$

or, a total unmitigated architectural generated VOC level of 71.2 pounds per day. It can be shown that the VOC load can be reduced by a factor of 2.56 / 7.12 = 0.36 through the application of Low VOC paints.[34] This would produce final VOC levels of 0.36 x 71.2 = 25.6 pounds of VOC per day. No remedial impacts would be expected.

---

[32] Finish painting implies, in the context of this report, complete surface area painting consisting of two coats as well as any required trim work. The referenced square-footage is the floor area square-footage per SCAQMD.

[33] HVLP = High-Volume, Low-Pressure (HVLP) painting system.

[34] SCAQMD CEQA Handbook Table A11-13-C.

Project Vehicular Emission Levels

Motor vehicles are the primary source of emissions associated with the proposed project area. Typically, uses such as the proposed project do not directly emit significant amounts of air pollutants from onsite activities. Rather, vehicular trips to and from these land uses are the significant contributor.

The calculated daily emission levels due to travel to and from the site are shown below in Table 7. The Ramona Branch Library site is expected to have a worst-case year 2013 trip generation level of 975 ADT based upon the cumulative trip generation produced for the proposed project.[35,36] The average one-way trip length would be 5.0 miles, since this development would mostly service the Town of Ramona.[37] A median speed of 45 MPH was used, consistent with average values observed (i.e., combined highway and surface street traffic activity). Based upon the findings, no significant impacts for any criteria pollutants were identified.

TABLE 7: Operational Vehicle Trip Emissions – Proposed Ramona Branch Library Development

		Aggregate Trip Emissions in Pounds / Day					
Development Phase	**ADT**	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**	**ROG**
EMFAC 2007 Year 2013 Emission Rates (in grams/mile @ 45 MPH)							
Light Duty Autos (LDA):		1.767	0.233	0.003	0.008	0.008	0.048
Light Duty Trucks (LDT):		2.241	0.358	0.003	0.018	0.018	0.050
Medium Duty Trucks (MDT):		2.513	0.744	0.005	0.019	0.019	0.080
Heavy Duty Trucks (HDT):		3.378	8.051	0.013	0.252	0.251	0.370
Buses (UBUS):		3.443	14.558	0.021	0.144	0.144	0.462
Motorcycles (MCY):		27.974	1.478	0.002	0.023	0.023	2.557
Proposed Project Action @ 975 Net ADT							
Light Duty Autos (LDA):	673	13.10	1.73	0.02	0.06	0.1	0.36
Light Duty Trucks (LDT):	189	4.67	0.75	0.01	0.04	0.0	0.10
Medium Duty Trucks (MDT):	62	1.73	0.51	0.00	0.01	0.0	0.06
Heavy Duty Trucks (HDT):	46	1.71	4.07	0.01	0.13	0.1	0.19
Buses (UBUS):	0	0.00	0.00	0.00	0.00	0.0	0.00
Motorcycles (MCY):	5	1.50	0.08	0.00	0.00	0.0	0.14
Total:	**975**	**22.7**	**7.1**	**0.0**	**0.2**	**0.2**	**0.8**
Significance Threshold (SDAPCD):		**550**	**250**	**250**	**100**	**55**	**75**

Assumes:
- Average 5.0-mile trip distance per vehicle (Proposed Project).
- San Diego air basin wintertime conditions (50° F).[38] For operational traffic, the fractional emission factor is 0.998 $PM_{2.5}$ / PM_{10}.

[35] These are direct trips and not passenger car equivalents (or PCE's).

[36] Source: *Traffic Impact Analysis – Ramona Library, Ramona, CA – Linscott, Law & Greenspan, 5/14/09.*

[37] The average assumed trip length is the average travel distance to or from the site. It is anticipated that some end trips will be shorter, and some longer, but for the purposes of analysis, the average value is given.

[38] Which is the condition whereby pollutant concentrations have the highest persistence and thus are most likely to produce an impact in a CEQA context.

Predicted CO / NO_x / PM_{10} / $PM_{2.5}$ Concentration Levels

Table 8, below, lists the roadway segments identified by the traffic engineer for the cumulative build out plus project scenario, the predicted peak hour traffic volume, and the expected CO, NO_x, PM_{10}, and $PM_{2.5}$ emissions at 100 feet from the road centerline (minimum possible standing receptor distance).

TABLE 8: CALINE4 Dispersion Results – CO / NO_X / PM_{10} / $PM_{2.5}$

Roadway	Segment	LOS	ADT	CO (ppm)	NO_X (pphm)	PM_{10} (ppm)	$PM_{2.5}$ (ppm)
SR 67 (Scenario A)	West of 13th Street	D	30,330	1.2	9.4	3.8	3.8
	East of 13th Street	D	31,120	1.3	9.4	3.9	3.9
SR 67 (Scenario B)	West of 13th Street	D	28,300	1.2	9.3	3.7	3.7
	East of 13th Street	D	28,920	1.2	9.3	3.7	3.7
SR 67 (Scenario C)	West of 13th Street	D	28,280	1.2	9.3	3.7	3.7
	East of 13th Street	D	28,900	1.2	9.3	3.7	3.7
SR 67 (Scenario D)	West of 13th Street	D	27,270	1.2	9.3	3.6	3.6
	East of 13th Street	D	27,890	1.2	9.3	3.6	3.6

Based upon the dispersion model findings, no localized criteria pollutant impacts were identified for any roadway segment examined. The roadway segments examined were found to comply with the CAAQS and NAAQS standards.

Odor Impact Potential to Proposed Site

The inhalation of volatile organic compounds (VOC's) causes smell sensations in humans. These odors can affect human health in four primary ways:

- The VOC's can produce toxicological effects;
- The odorant compounds can cause irritations in the eye, nose, and throat;
- The VOC's can stimulate sensory nerves that can cause potentially harmful health effects;
- The exposure to perceived unpleasant odors can stimulate negative cognitive and emotional responses based on previous experiences with such odors.

Development of the proposed project site could generate trace amounts (less than 1 $\mu g/m^3$) of substances such as ammonia, carbon dioxide, hydrogen sulfide, methane, dust, organic dust, and endotoxins (i.e., bacteria are present in the dust). Additionally, proposed onsite uses could generate such substances as volatile organic acids, alcohols, aldehydes, amines, fixed gases, carbonyls, esters, sulfides, disulfides, mercaptans, and nitrogen heterocycles.

It should be noted that odor generation impacts due to the project are not expected to be significant since any odor generation would be intermittent and would terminate upon completion of the construction phase of the project. As a result, no significant air quality impacts are expected to surrounding residential receptors. No mitigation for odors is identified.

Predicted Operational Emission Levels

As previously discussed, fixed emission sources under this context would consist entirely of small gasoline engines used with lawn mowers and landscaping equipment as well as emissive sources from natural gas powered appliances (such as hot water heaters, etc.). Each of these sources is discussed in detail below.

Small Gasoline Engine Emission Sources

Landscaping equipment utilized in the course of maintenance of the Ramona Branch Library project typically would consist of a five horsepower four-stroke lawnmower and a small weed trimmer having a two-stroke engine with approximately 30 to 50 cubic-centimeters of displacement.[39] For the purposes of analysis, the proposed library structure will be treated as a single {CARB-classified} retail space with a usable floor area of 19,500 square-feet.

This equates to the following fixed emission levels in pounds per day for the aggregate of the proposed project development plan:

Land Use Type	CO (lb/day)	NO_x (lb/day)	SO_x (lb/day)	PM_{10} (lb/day)	ROG (lb/day)
Library Space	0.3	0.0	0.0	0.0	0.0

These sources would be classified as insignificant emission sources and would not generate an air quality impact.

[39] Assuming cleaner burning engines purchased new from the store by the ultimate homeowner, the following emissions rates (in pounds per day per unit) are promulgated by CARB:

Pollutant	Single-Family Emissions Per Unit	Multi-Family/Retail Emissions Per Unit
CO	0.00576	0.276
NO_x	0.00014	0.005
SO_x	0.0002	0.0001
PM_{10}	0.000005	0.00037
ROG	0.00054	0.0315

It should be noted that these emission factors are also the identical emission factors utilized by the URBEMIS model.

Natural Gas Emission Sources

Natural gas consumption (typically due to usage of central heating units and water heaters) would produce the following approximate total pounds of combustion emissions:

$$CP_{combustion} = ER \times \left[\frac{NU \times UR}{30} \right] \times 1x10^{-6}$$

where, CP = The criteria pollutant under examination (i.e., CO, NO_x, PM_{10}, or ROG)

ER = Emissions rate of criteria pollutant per million-cubic-feet of natural gas consumed.

CO = 40 pounds/MM Cubic-feet

NO_x = 94 pounds/MM Cubic-feet

PM_{10} = 0.18 pounds/MM Cubic-feet

ROG = 7.26 pounds/MM Cubic-feet

NU = Total number of units per land use type (i.e., residential/commercial),

UR = Specific natural gas usage rate per development type (Single-Family = 6,665 ft^3/month, Multi-family = 4,011.5 ft^3/month, Retail Space = 2.9 ft^3/SF/month)

As before, the proposed library structure will be treated as a single retail space with a usable floor area of 19,500 square-feet. This equates to the following fixed emission levels in pounds per day for the aggregate of the proposed development plan:

Land Use Type	CO (lb/day)	NO_x (lb/day)	PM_{10} (lb/day)	ROG (lb/day)
Library Space	0.1	0.2	0.0	0.0

These sources would be classified as insignificant emission sources and would not generate an air quality impact.

CONCLUSIONS AND RECOMMENDATIONS

Aggregate Project Emissions

The aggregate emission levels produced by the proposed Ramona Branch Library Development are shown below in Table 9. Based upon the findings, no construction air quality impacts are anticipated during either the construction of operational phases of the project.

TABLE 9: Aggregate Emissions Synopsis – Proposed Ramona Branch Library Development

	Aggregate Emissions in Pounds / Day					
SCENARIO EXAMINED	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**[40]	**ROG/VOC**
Construction Grading Operations						
Construction Grading Vehicle Emissions	57.7	120.7	11.7	8.5	8.0	10.8
Surface Grading Dust Generation:	- -	- -	- -	12.5	2.6	- -
Powered Haulage Generation:	0.0	0.0	0.0	11.5	2.4	0.0
Total (Σ):	**57.7**	**120.7**	**11.7**	**32.6**	**13.1**	**10.8**
Construction Building Operations						
Low VOC Paint Application (Σ):	- -	- -	- -	- -	- -	**71.2**
Total (Σ):	- -	- -	- -	- -	- -	**71.2**
Project Operations						
Vehicular Traffic Generation (Table 7):	22.7	7.1	0.0	0.2	0.2	0.8
Fixed Source #3 (Small Engine Usage – Retail):	0.3	0.0	0.0	0.0	- -	0.0
Fixed Source #6 (Natural Gas Combustion - Retail):	0.1	0.2	- -	0.0	- -	0.0
Total (Σ):	**23.1**	**7.3**	**0.0**	**0.2**	**0.2**	**0.9**
Significance Threshold (SDAPCD):	**550**	**250**	**250**	**100**	**55**	**75**

Consistency with Regional Air Quality Management Plans

Finally, the San Diego APCD establishes what could be thought of as an *"emissions budget"* or Regional Air Quality Strategy (RAQS) for the San Diego Air Basin. This budget takes into account existing conditions, planned growth based on General Plans for cities within the region, and air quality control measures implemented by the SDAPCD.

[40] Values shown in this column are for informational purposes only. $PM_{2.5}$ emissions are not currently regulated by CARB. The 55 pound-per-day level shown is a proposed standard that has not been adopted.

The "emissions budget" accounts for current emissions associated with the proposed project, as well as previously approved projects consistent with current General Plan policies. Therefore, determining whether the proposed project is consistent with the RAQS requires a comparison of net emissions from the proposed development to the emissions associated with previously approved and accounted for plans (commonly known as the *Consistency Criterion* of the RAQS).

The proposed Ramona Branch Library development is consistent with future build out plans for the project site under the City's General Plan and therefore satisfies the *Consistency Criterion* of the RAQS.

CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE) located at 1134 D Street, Ramona, CA 92065. The members of its professional staff contributing to the report are listed below:

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ISE affirms to the best of its knowledge and belief that the statements and information contained herein are in all respects true and correct as of the date of this report. Should the reader have any questions regarding the findings and conclusions presented in this report, please do not hesitate to contact ISE at (760) 787-0016.

Content and information contained within this report is intended only for the subject project and is protected under 17 U.S.C. §§ 101 through 810. Original reports contain non-photo blue ISE watermark at the bottom of each page.

Approved as to Form and Content:

Rick Tavares

Rick Tavares, Ph.D.
Project Principal
Investigative Science and Engineering, Inc.

APPENDICES / SUPPLEMENTAL INFORMATION

EMFAC 2007 EMISSION FACTOR TABULATIONS – SCENARIO YEAR 2013

```
Title    : San Diego County Subarea Winter CYr 2013
Version  : Emfac2007 V2.3 Nov 1 2006
Run Date : 2009/05/04 13:32:43

Scen Year: 2013 -- All model years in the range 1969 to 2013 selected
Season   : Winter
Area     : San Diego
****************************************************************************************
     Year: 2013 -- Model Years 1969 to 2013 Inclusive -- Winter
     Emfac2007 Emission Factors: V2.3 Nov 1 2006

     County Average                          San Diego                 County Average

                        Table   1:  Running Exhaust Emissions (grams/mile)

     Pollutant Name: Reactive Org Gases       Temperature:  50F  Relative Humidity:  40%
```

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
10	0.220	0.222	0.375	2.732	1.921	4.130	0.375
15	0.150	0.154	0.260	1.440	1.397	3.327	0.245
20	0.109	0.112	0.190	0.862	1.056	2.815	0.175
25	0.083	0.086	0.145	0.692	0.830	2.501	0.138
30	0.067	0.070	0.116	0.564	0.678	2.335	0.115
35	0.057	0.060	0.098	0.471	0.575	2.291	0.100
40	0.051	0.053	0.086	0.407	0.506	2.362	0.092
45	0.048	0.050	0.080	0.370	0.462	2.557	0.089
50	0.048	0.050	0.078	0.358	0.439	2.907	0.091
55	0.050	0.052	0.080	0.369	0.432	3.468	0.099
60	0.056	0.057	0.086	0.403	0.441	4.338	0.113
65	0.065	0.067	0.099	0.461	0.467	5.687	0.137

```
     Pollutant Name: Carbon Monoxide          Temperature:  50F  Relative Humidity:  40%
```

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
10	3.264	4.205	5.295	12.374	14.293	28.246	4.421
15	2.896	3.707	4.428	8.668	9.811	24.641	3.784
20	2.602	3.314	3.818	6.452	7.135	22.464	3.324
25	2.363	3.000	3.375	5.254	5.498	21.397	2.988
30	2.167	2.744	3.047	4.436	4.488	21.308	2.732
35	2.005	2.537	2.803	3.886	3.879	22.218	2.539
40	1.872	2.370	2.628	3.544	3.551	24.309	2.402
45	1.767	2.241	2.513	3.378	3.443	27.974	2.319
50	1.688	2.147	2.459	3.378	3.534	33.932	2.297
55	1.637	2.092	2.472	3.553	3.840	43.456	2.349
60	1.621	2.083	2.572	3.932	4.418	58.819	2.506
65	1.650	2.136	2.794	4.575	5.382	84.163	2.823

Pollutant Name: Oxides of Nitrogen Temperature: 50F Relative Humidity: 40%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
10	0.362	0.567	1.025	14.012	22.793	1.326	1.077
15	0.322	0.499	0.911	10.805	18.464	1.319	0.891
20	0.291	0.449	0.831	9.317	15.725	1.325	0.789
25	0.269	0.412	0.777	8.754	14.069	1.340	0.735
30	0.253	0.386	0.744	8.353	13.213	1.363	0.698
35	0.242	0.369	0.728	8.102	13.016	1.394	0.675
40	0.235	0.360	0.728	7.999	13.443	1.432	0.666
45	0.233	0.358	0.744	8.051	14.558	1.478	0.670
50	0.234	0.363	0.778	8.273	16.534	1.530	0.689
55	0.240	0.376	0.833	8.694	19.708	1.591	0.724
60	0.250	0.398	0.914	9.358	24.673	1.661	0.779
65	0.265	0.431	1.031	10.339	32.469	1.741	0.862

Pollutant Name: Sulfur Dioxide Temperature: 50F Relative Humidity: 40%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
10	0.007	0.009	0.012	0.022	0.024	0.003	0.009
15	0.005	0.007	0.009	0.019	0.023	0.002	0.007
20	0.004	0.006	0.008	0.016	0.022	0.002	0.006
25	0.004	0.005	0.006	0.015	0.022	0.002	0.005
30	0.003	0.004	0.006	0.015	0.021	0.002	0.004
35	0.003	0.004	0.005	0.014	0.021	0.002	0.004
40	0.003	0.004	0.005	0.014	0.021	0.002	0.004
45	0.003	0.003	0.005	0.013	0.021	0.002	0.004
50	0.003	0.004	0.005	0.013	0.021	0.002	0.004
55	0.003	0.004	0.005	0.013	0.021	0.002	0.004
60	0.003	0.004	0.006	0.014	0.021	0.003	0.004
65	0.004	0.005	0.006	0.014	0.022	0.003	0.005

Pollutant Name: PM10 Temperature: 50F Relative Humidity: 40%

Speed MPH	LDA	LDT	MDT	HDT	UBUS	MCY	ALL
10	0.038	0.080	0.085	0.703	0.518	0.034	0.084
15	0.026	0.055	0.059	0.502	0.388	0.028	0.059
20	0.019	0.040	0.043	0.379	0.301	0.024	0.043
25	0.014	0.031	0.033	0.324	0.242	0.022	0.034
30	0.012	0.025	0.027	0.285	0.202	0.021	0.029
35	0.010	0.021	0.023	0.261	0.174	0.020	0.025
40	0.009	0.019	0.020	0.250	0.156	0.021	0.023
45	0.008	0.018	0.019	0.252	0.144	0.023	0.022
50	0.008	0.017	0.018	0.267	0.139	0.026	0.023
55	0.008	0.018	0.019	0.294	0.138	0.031	0.024
60	0.009	0.020	0.021	0.332	0.142	0.038	0.027
65	0.011	0.023	0.023	0.383	0.151	0.050	0.031

SCREEN3 Model Output for Criteria Pollutants: CO, NO_x, SO_x, and PM_{10}

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

RAMONA BRANCH LIBRARY MASS GRADING - CO

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =        AREA
   EMISSION RATE (G/(S-M**2)) =      .102260E-04
   SOURCE HEIGHT (M)          =       3.0000
   LENGTH OF LARGER SIDE (M)  =     172.1000
   LENGTH OF SMALLER SIDE (M) =     172.1000
   RECEPTOR HEIGHT (M)        =      10.0000
   URBAN/RURAL OPTION         =       RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC             U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
------- ----------  ----  -----  -----  ------  ------  -------
    20.   41.80        1    1.0    1.0   320.0    3.00     45.
   100.   70.71        3    1.0    1.0   320.0    3.00     45.
   200.   97.60        4    1.0    1.0   320.0    3.00     45.
   300.   103.5        5    1.0    1.0 10000.0    3.00     45.
   400.   101.4        5    1.0    1.0 10000.0    3.00     45.
   500.   104.1        6    1.0    1.0 10000.0    3.00     45.
   600.   103.4        6    1.0    1.0 10000.0    3.00     45.
   700.   99.71        6    1.0    1.0 10000.0    3.00     45.
   800.   94.93        6    1.0    1.0 10000.0    3.00     45.
   900.   89.85        6    1.0    1.0 10000.0    3.00     45.
  1000.   84.82        6    1.0    1.0 10000.0    3.00     45.
  1100.   80.05        6    1.0    1.0 10000.0    3.00     45.
  1200.   75.57        6    1.0    1.0 10000.0    3.00     45.
  1300.   71.34        6    1.0    1.0 10000.0    3.00     45.
  1400.   67.38        6    1.0    1.0 10000.0    3.00     45.
  1500.   63.68        6    1.0    1.0 10000.0    3.00     45.
  1600.   60.22        6    1.0    1.0 10000.0    3.00     45.
  1700.   57.00        6    1.0    1.0 10000.0    3.00     45.
  1800.   54.01        6    1.0    1.0 10000.0    3.00     44.
  1900.   51.23        6    1.0    1.0 10000.0    3.00     44.
  2000.   48.67        6    1.0    1.0 10000.0    3.00     45.
  2100.   46.38        6    1.0    1.0 10000.0    3.00     45.
  2200.   44.27        6    1.0    1.0 10000.0    3.00     44.
  2300.   42.31        6    1.0    1.0 10000.0    3.00     45.
  2400.   40.48        6    1.0    1.0 10000.0    3.00     45.
  2500.   38.75        6    1.0    1.0 10000.0    3.00     45.
  2600.   37.14        6    1.0    1.0 10000.0    3.00     45.
  2700.   35.63        6    1.0    1.0 10000.0    3.00     45.
  2800.   34.21        6    1.0    1.0 10000.0    3.00     44.
  2900.   32.88        6    1.0    1.0 10000.0    3.00     45.
  3000.   31.63        6    1.0    1.0 10000.0    3.00     44.
  3500.   26.64        6    1.0    1.0 10000.0    3.00     43.
  4000.   22.83        6    1.0    1.0 10000.0    3.00     43.
  4500.   19.85        6    1.0    1.0 10000.0    3.00     40.
  5000.   17.46        6    1.0    1.0 10000.0    3.00     45.
  5500.   15.52        6    1.0    1.0 10000.0    3.00     45.
  6000.   13.93        6    1.0    1.0 10000.0    3.00     37.
  6500.   12.59        6    1.0    1.0 10000.0    3.00     42.
  7000.   11.46        6    1.0    1.0 10000.0    3.00     31.
  7500.   10.53        6    1.0    1.0 10000.0    3.00     31.
  8000.   9.717        6    1.0    1.0 10000.0    3.00     31.
  8500.   9.011        6    1.0    1.0 10000.0    3.00     44.
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  9000.   8.392        6     1.0     1.0 10000.0    3.00     42.
  9500.   7.844        6     1.0     1.0 10000.0    3.00     40.
 10000.   7.355        6     1.0     1.0 10000.0    3.00     38.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    20. M:
   531.   104.4        6     1.0     1.0 10000.0    3.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------     -----------   -------   -------
SIMPLE TERRAIN       104.4          531.        0.
```

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

RAMONA BRANCH LIBRARY MASS GRADING - NOX

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                 =         AREA
   EMISSION RATE (G/(S-M**2))  =      .213910E-04
   SOURCE HEIGHT (M)           =       3.0000
   LENGTH OF LARGER SIDE (M)   =     172.1000
   LENGTH OF SMALLER SIDE (M)  =     172.1000
   RECEPTOR HEIGHT (M)         =      10.0000
   URBAN/RURAL OPTION          =        RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST     CONC           U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ----------  ----  -----  -----  ------  ------  -------
    20.   87.43        1     1.0    1.0   320.0    3.00     45.
   100.   147.9        3     1.0    1.0   320.0    3.00     45.
   200.   204.2        4     1.0    1.0   320.0    3.00     45.
   300.   216.5        5     1.0    1.0 10000.0    3.00     45.
   400.   212.1        5     1.0    1.0 10000.0    3.00     45.
   500.   217.8        6     1.0    1.0 10000.0    3.00     45.
   600.   216.3        6     1.0    1.0 10000.0    3.00     45.
   700.   208.6        6     1.0    1.0 10000.0    3.00     45.
   800.   198.6        6     1.0    1.0 10000.0    3.00     45.
   900.   187.9        6     1.0    1.0 10000.0    3.00     45.
  1000.   177.4        6     1.0    1.0 10000.0    3.00     45.
  1100.   167.4        6     1.0    1.0 10000.0    3.00     45.
  1200.   158.1        6     1.0    1.0 10000.0    3.00     45.
  1300.   149.2        6     1.0    1.0 10000.0    3.00     45.
  1400.   140.9        6     1.0    1.0 10000.0    3.00     45.
  1500.   133.2        6     1.0    1.0 10000.0    3.00     45.
  1600.   126.0        6     1.0    1.0 10000.0    3.00     45.
  1700.   119.2        6     1.0    1.0 10000.0    3.00     45.
  1800.   113.0        6     1.0    1.0 10000.0    3.00     44.
  1900.   107.2        6     1.0    1.0 10000.0    3.00     44.
  2000.   101.8        6     1.0    1.0 10000.0    3.00     45.
  2100.   97.02        6     1.0    1.0 10000.0    3.00     45.
  2200.   92.61        6     1.0    1.0 10000.0    3.00     44.
  2300.   88.50        6     1.0    1.0 10000.0    3.00     45.
  2400.   84.67        6     1.0    1.0 10000.0    3.00     45.
  2500.   81.06        6     1.0    1.0 10000.0    3.00     45.
  2600.   77.68        6     1.0    1.0 10000.0    3.00     45.
  2700.   74.52        6     1.0    1.0 10000.0    3.00     45.
  2800.   71.55        6     1.0    1.0 10000.0    3.00     44.
  2900.   68.77        6     1.0    1.0 10000.0    3.00     45.
  3000.   66.17        6     1.0    1.0 10000.0    3.00     44.
  3500.   55.73        6     1.0    1.0 10000.0    3.00     43.
  4000.   47.75        6     1.0    1.0 10000.0    3.00     43.
  4500.   41.52        6     1.0    1.0 10000.0    3.00     40.
  5000.   36.52        6     1.0    1.0 10000.0    3.00     45.
  5500.   32.47        6     1.0    1.0 10000.0    3.00     45.
  6000.   29.14        6     1.0    1.0 10000.0    3.00     37.
  6500.   26.34        6     1.0    1.0 10000.0    3.00     42.
  7000.   23.97        6     1.0    1.0 10000.0    3.00     31.
  7500.   22.02        6     1.0    1.0 10000.0    3.00     31.
  8000.   20.33        6     1.0    1.0 10000.0    3.00     31.
  8500.   18.85        6     1.0    1.0 10000.0    3.00     44.
  9000.   17.55        6     1.0    1.0 10000.0    3.00     42.
  9500.   16.41        6     1.0    1.0 10000.0    3.00     40.
 10000.   15.39        6     1.0    1.0 10000.0    3.00     38.
```

```
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    20. M:
   531.   218.3        6     1.0     1.0 10000.0    3.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN       218.3         531.        0.
```

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

RAMONA BRANCH LIBRARY MASS GRADING - SOX

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =        AREA
   EMISSION RATE (G/(S-M**2))  =      .207350E-05
   SOURCE HEIGHT (M)          =      3.0000
   LENGTH OF LARGER SIDE (M)  =     172.1000
   LENGTH OF SMALLER SIDE (M) =     172.1000
   RECEPTOR HEIGHT (M)        =      10.0000
   URBAN/RURAL OPTION         =       RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
20.	8.475	1	1.0	1.0	320.0	3.00	45.
100.	14.34	3	1.0	1.0	320.0	3.00	45.
200.	19.79	4	1.0	1.0	320.0	3.00	45.
300.	20.98	5	1.0	1.0	10000.0	3.00	45.
400.	20.56	5	1.0	1.0	10000.0	3.00	45.
500.	21.11	6	1.0	1.0	10000.0	3.00	45.
600.	20.96	6	1.0	1.0	10000.0	3.00	45.
700.	20.22	6	1.0	1.0	10000.0	3.00	45.
800.	19.25	6	1.0	1.0	10000.0	3.00	45.
900.	18.22	6	1.0	1.0	10000.0	3.00	45.
1000.	17.20	6	1.0	1.0	10000.0	3.00	45.
1100.	16.23	6	1.0	1.0	10000.0	3.00	45.
1200.	15.32	6	1.0	1.0	10000.0	3.00	45.
1300.	14.47	6	1.0	1.0	10000.0	3.00	45.
1400.	13.66	6	1.0	1.0	10000.0	3.00	45.
1500.	12.91	6	1.0	1.0	10000.0	3.00	45.
1600.	12.21	6	1.0	1.0	10000.0	3.00	45.
1700.	11.56	6	1.0	1.0	10000.0	3.00	45.
1800.	10.95	6	1.0	1.0	10000.0	3.00	44.
1900.	10.39	6	1.0	1.0	10000.0	3.00	44.
2000.	9.869	6	1.0	1.0	10000.0	3.00	45.
2100.	9.404	6	1.0	1.0	10000.0	3.00	45.
2200.	8.977	6	1.0	1.0	10000.0	3.00	44.
2300.	8.578	6	1.0	1.0	10000.0	3.00	45.
2400.	8.207	6	1.0	1.0	10000.0	3.00	45.
2500.	7.857	6	1.0	1.0	10000.0	3.00	45.
2600.	7.530	6	1.0	1.0	10000.0	3.00	45.
2700.	7.224	6	1.0	1.0	10000.0	3.00	45.
2800.	6.936	6	1.0	1.0	10000.0	3.00	44.
2900.	6.666	6	1.0	1.0	10000.0	3.00	45.
3000.	6.414	6	1.0	1.0	10000.0	3.00	44.
3500.	5.402	6	1.0	1.0	10000.0	3.00	43.
4000.	4.629	6	1.0	1.0	10000.0	3.00	43.
4500.	4.025	6	1.0	1.0	10000.0	3.00	40.
5000.	3.540	6	1.0	1.0	10000.0	3.00	45.
5500.	3.148	6	1.0	1.0	10000.0	3.00	45.
6000.	2.825	6	1.0	1.0	10000.0	3.00	37.
6500.	2.553	6	1.0	1.0	10000.0	3.00	42.
7000.	2.324	6	1.0	1.0	10000.0	3.00	31.
7500.	2.135	6	1.0	1.0	10000.0	3.00	31.
8000.	1.970	6	1.0	1.0	10000.0	3.00	31.
8500.	1.827	6	1.0	1.0	10000.0	3.00	44.
9000.	1.702	6	1.0	1.0	10000.0	3.00	42.
9500.	1.591	6	1.0	1.0	10000.0	3.00	40.
10000.	1.491	6	1.0	1.0	10000.0	3.00	38.

```
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    20. M:
   531.   21.16         6     1.0     1.0 10000.0    3.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------    -----------    -------   -------
SIMPLE TERRAIN      21.16          531.        0.
```

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 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

RAMONA BRANCH LIBRARY MASS GRADING - PM10

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =        AREA
   EMISSION RATE (G/(S-M**2)) =      .150640E-05
   SOURCE HEIGHT (M)          =       3.0000
   LENGTH OF LARGER SIDE (M)  =     172.1000
   LENGTH OF SMALLER SIDE (M) =     172.1000
   RECEPTOR HEIGHT (M)        =      10.0000
   URBAN/RURAL OPTION         =       RURAL
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =     .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***
```

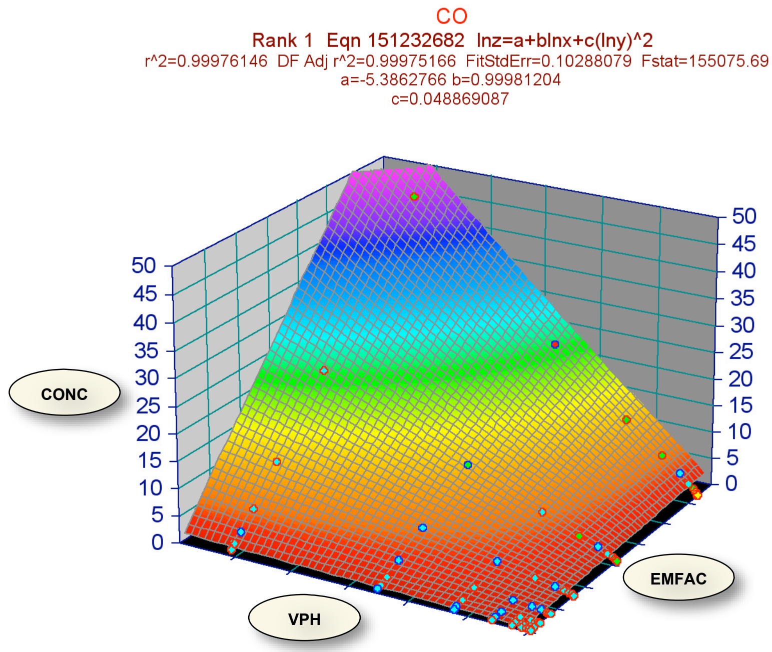
DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
20.	6.157	1	1.0	1.0	320.0	3.00	45.
100.	10.42	3	1.0	1.0	320.0	3.00	45.
200.	14.38	4	1.0	1.0	320.0	3.00	45.
300.	15.25	5	1.0	1.0	10000.0	3.00	45.
400.	14.94	5	1.0	1.0	10000.0	3.00	45.
500.	15.34	6	1.0	1.0	10000.0	3.00	45.
600.	15.23	6	1.0	1.0	10000.0	3.00	45.
700.	14.69	6	1.0	1.0	10000.0	3.00	45.
800.	13.98	6	1.0	1.0	10000.0	3.00	45.
900.	13.24	6	1.0	1.0	10000.0	3.00	45.
1000.	12.49	6	1.0	1.0	10000.0	3.00	45.
1100.	11.79	6	1.0	1.0	10000.0	3.00	45.
1200.	11.13	6	1.0	1.0	10000.0	3.00	45.
1300.	10.51	6	1.0	1.0	10000.0	3.00	45.
1400.	9.926	6	1.0	1.0	10000.0	3.00	45.
1500.	9.381	6	1.0	1.0	10000.0	3.00	45.
1600.	8.871	6	1.0	1.0	10000.0	3.00	45.
1700.	8.397	6	1.0	1.0	10000.0	3.00	45.
1800.	7.956	6	1.0	1.0	10000.0	3.00	44.
1900.	7.546	6	1.0	1.0	10000.0	3.00	44.
2000.	7.170	6	1.0	1.0	10000.0	3.00	45.
2100.	6.832	6	1.0	1.0	10000.0	3.00	45.
2200.	6.522	6	1.0	1.0	10000.0	3.00	44.
2300.	6.232	6	1.0	1.0	10000.0	3.00	45.
2400.	5.962	6	1.0	1.0	10000.0	3.00	45.
2500.	5.708	6	1.0	1.0	10000.0	3.00	45.
2600.	5.471	6	1.0	1.0	10000.0	3.00	45.
2700.	5.248	6	1.0	1.0	10000.0	3.00	45.
2800.	5.039	6	1.0	1.0	10000.0	3.00	44.
2900.	4.843	6	1.0	1.0	10000.0	3.00	45.
3000.	4.660	6	1.0	1.0	10000.0	3.00	44.
3500.	3.925	6	1.0	1.0	10000.0	3.00	43.
4000.	3.363	6	1.0	1.0	10000.0	3.00	43.
4500.	2.924	6	1.0	1.0	10000.0	3.00	40.
5000.	2.572	6	1.0	1.0	10000.0	3.00	45.
5500.	2.287	6	1.0	1.0	10000.0	3.00	45.
6000.	2.052	6	1.0	1.0	10000.0	3.00	37.
6500.	1.855	6	1.0	1.0	10000.0	3.00	42.
7000.	1.688	6	1.0	1.0	10000.0	3.00	31.
7500.	1.551	6	1.0	1.0	10000.0	3.00	31.
8000.	1.431	6	1.0	1.0	10000.0	3.00	31.
8500.	1.327	6	1.0	1.0	10000.0	3.00	44.
9000.	1.236	6	1.0	1.0	10000.0	3.00	42.
9500.	1.156	6	1.0	1.0	10000.0	3.00	40.
10000.	1.084	6	1.0	1.0	10000.0	3.00	38.

```
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    20. M:
   531.   15.37        6     1.0     1.0 10000.0    3.00     45.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC    DIST TO   TERRAIN
  PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN      15.37          531.        0.
```

CALINE4 SOLUTION SPACE RESULTS – SCENARIO CO

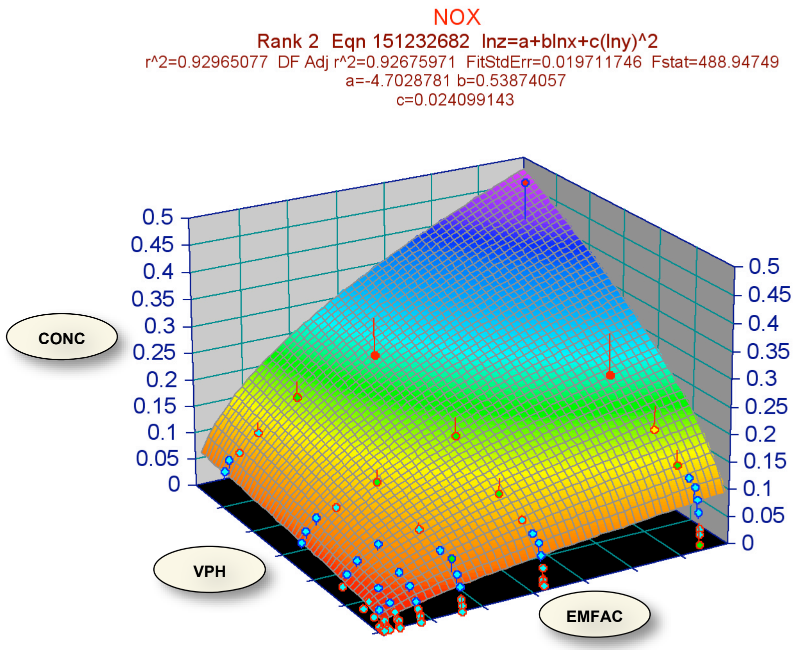


Rank 1 Eqn 151232682 $\ln z = a + b\ln x + c(\ln y)^2$

r^2 Coef Det	DF Adj r^2	Fit Std Err	F-value
0.9997614637	0.9997516609	0.102880788	155075.68815

Parm	Value	Std Error	t-value	95.00% Confidence Limits		P>|t|
a	-5.38627658	0.022750405	-236.75519	-5.43160775	-5.34094541	0.00000
b	0.999812043	0.003657036	273.3940571	0.992525238	1.007098847	0.00000
c	0.048869087	0.000171868	284.3402911	0.048526632	0.049211542	0.00000

CALINE4 SOLUTION SPACE RESULTS – SCENARIO NO_X

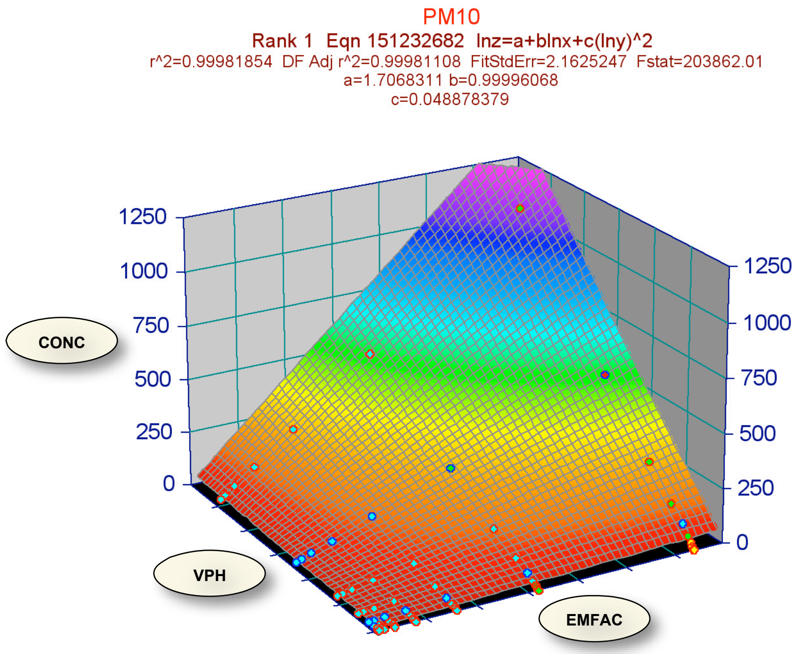


Rank 1 Eqn 151232653 $\ln z = a + bx^{0.5} + c(\ln y)^2$

r^2 Coef Det	DF Adj r^2	Fit Std Err	F-value
0.9311638335	0.9283349499	0.0194986151	500.50814223

Parm	Value	Std Error	t-value	95.00% Confidence Limits		P>|t|
a	-5.48793064	0.131941715	-41.593598	-5.75083025	-5.22503104	0.00000
b	0.756396215	0.037072879	20.40295328	0.682526891	0.830265538	0.00000
c	0.023350423	0.001103789	21.15477893	0.021151074	0.025549771	0.00000

CALINE4 SOLUTION SPACE RESULTS – SCENARIO PM_{10}



Rank 1 Eqn 151232682 $\ln z = a + b \ln x + c(\ln y)^2$

r^2 Coef Det	DF Adj r^2	Fit Std Err	F-value
0.9998185376	0.9998110803	2.1625247335	203862.00724

Parm	Value	Std Error	t-value	95.00% Confidence Limits		P>|t|
a	1.706831053	0.01706339	100.0288368	1.672831506	1.7408306	0.00000
b	0.999960683	0.003187502	313.7129842	0.993609447	1.006311919	0.00000
c	0.048878379	0.000149717	326.4708691	0.048580061	0.049176698	0.00000

INDEX OF IMPORTANT TERMS